What makes

V-Belts with the Green Seal

your best belt buy—by far

A Special tension members of steel cable or exclusive, synthetic Triple-Tempered (3-T) Cords—carefully tempered with Tension, Temperature and Time for maximum strength with minimum stretch.

B Tension and compression sections of mildew-inhibited rubber compounds—designed to the job—and manufactured to team perfectly with whatever type load-carriers are used.

C Envelope of exclusive, bias-cut fabric impregnated with a minimum dusting, mildew-inhibited, friction-balanced rubber compound for long running without sticking or grabbing in the grooves.

—AND IT PAYS OFF IN

Dimensional Stability for belts that don't shrink or stretch in storage — for matched sets that *stay* matched

High Strength and Low Stretch on the drive — for maximum resistance to shock loads — minimum creep and take-ups

Clean, Smooth-Running Operation for maximum trouble-free, horsepower hours of operation — lowest possible power transmission costs

—SO NEXT TIME YOU NEED V-BELTS

— be sure you get belts with the Green Seal. See your Goodyear Distributor for details. Or write Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

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THE GREATEST NAME IN RUBBER

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Engineering Promotions

Carl Forsberg, formerly plant engineer, has been promoted to production manager of the Hartford City (Ind.) Division plant of Fort Wayne Corrugated Paper Company. He has been with the company since May, 1956.

C. Forsberg

P. M. Ziegler

He is a graduate of the Michigan College of Mining and Technology and had three years experience as an application and sales engineer as well as work in the electrical construction and maintenance field before joining the company as plant engineer.

Phillip M. Ziegler will take over the duties of plant engineer. He joined the company in May 1956, starting as power engineer for the company's four plants in Chicago, Hartford City, Pittsburgh and Rochester. Subsequently, he was assigned to special engineering duties. He holds a mechanical engineering degree, which he received from the Detroit Institute of Technology. He was with the City of Detroit Safety Engineering Department before he joined the company.

Maintenance Conference

FIRST ANNUAL conference of the recently organized Maintenance and Plant Engineering Group of the American Society of Mechanical Engineers will be held in the Penn-Sheraton Hotel, Pittsburgh, Pa., April 14 and 15.

Papers and discussions will cover engineered maintenance, maintenance organization, optimum stores, vibration problems, optical tooling and allied topics. A maintenance panel session will be held Tuesday morning, April 15, and the afternoon will be devoted to plant tours.

Details of the conference are being handled by members of the Pittsburgh ASME section. For more information about this conference address your inquiry to Dr. W. Forstall, Jr., Professor of Mechanical Engineering, Carnegie Institute of Technology, Schenley Park, Pittsburgh 13, Pa.

Welding Show and Conference

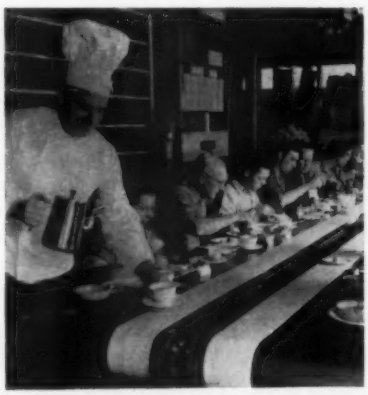
AMERICAN Welding Society will move the site of its annual Welding Show to St. Louis this year, as part of its continuing program to hold the exposition in different areas each year.

The exposition will be held at the Kiel Auditorium, from April 15 to 17, inclusive. During the same week, April 14 to 18, inclusive, the Society will hold its annual technical meeting at the Hotel Statler. An informal Welding Conference will also be conducted.

Visitors who wish hotel information and program details should write to A.W.S. Welding Show, c/o Robert T. Kenworthy, Exposition Management, 12 E. 41 St., New York 17, N. Y.

Convey the Coffee, Please

WHAT BETTER way to celebrate a 10th anniversary than to have the company's product play a part in the celebration? That is just what Hytrol Conveyor Company, Inc., did at their Milwaukee plant.



White belt helps waiter convey coffee at company's 10th anniversary luncheon

In place of the usual dining table, employees were served on the com-

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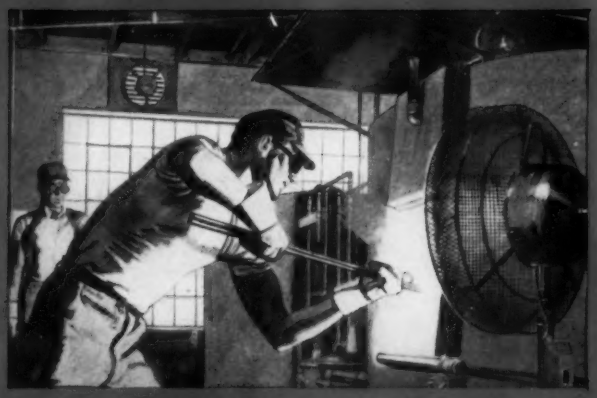
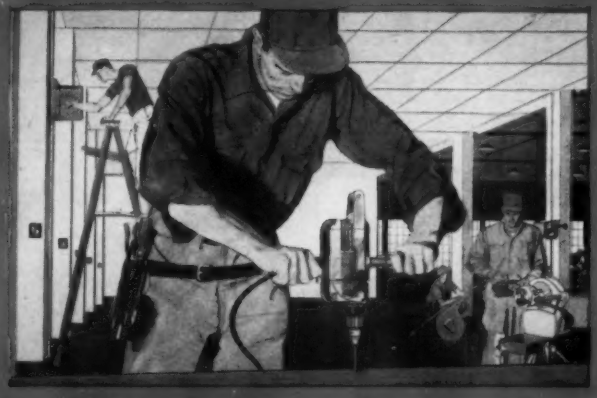


Production rates rise and employee relations improve with adequate ventilation . . . *from Graybar.*

The most complete selection of lighting units and G-E lamps available . . . *from Graybar.*



Modern tools speed the work on production lines or in the shop. Select, and order . . . *from Graybar.*

Planned power distribution . . . for flexibility in meeting present and future power needs . . . *from Graybar.*

For anything electrical . . . call Graybar first

Always call Graybar for anything and everything electrical. Through Graybar you have available over 100,000 electrical items, locally or through a nationwide network of warehouses. Ready to help you on any problem concerning lighting, ventilation, electronics and communication are Graybar Specialists.

The Graybar representative who calls on you, and Graybar "inside" personnel who back him up, can provide accurate catalog and quotation information on products of the world's leading manufacturers in every field of electricity. Further, Graybar is completely owned by its operating and retired personnel. Thus every Graybar man you deal with is vitally interested in seeing that your electrical needs are well and promptly served.

Next time you need anything electrical, large or small—rely on Graybar.

77-115

Send for a copy of "For Everything Electrical", a 28 page 2 color brochure which tells in digest form how Graybar's nationwide facilities are geared to serve every electrical need.

CALL **GraybaR** FIRST FOR

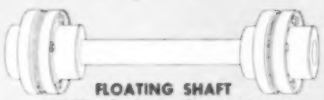
GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

For more facts circle 503 on Reply Card

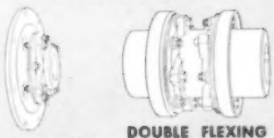
Specify
THOMAS
ALL METAL
FLEXIBLE COUPLINGS
FOR MAINTENANCE FREE POWER TRANSMISSION on PUMP, COMPRESSOR, MARINE and OTHER DRIVES

DBZ — for high speed, heavy duty drives

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.



FLOATING SHAFT
SMR — for heavy duty service with excessive misalignment



SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings

DOUBLE FLEXING
AMR — for engine and medium speed drives

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U. S. A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

pany's conveyor belt equipment. This might be a good way to discourage dawdling during the lunch hour. Or better still, it is an easy way to clear the table.

Prestressing Improves Fatigue Life of Tubing

IMPROVEMENT in fatigue life and a saving in weight in formed steel hydraulic tubing can be achieved by prestressing, according to an Air Force research report released for industry.

Improvements were noted after conducting prestressing tests on formed corrosion resistant steel tubing used in aircraft hydraulic systems. Forming was controlled to 5 to 10 per cent of flattening in the formed portion. Prestressing consisted of applying a high hydrostatic pressure inside the tubing after forming and before fatigue testing.

Results showed that the higher the prestressing pressure, the greater were fatigue life and tube permanent deformation. Prestressing brought a weight saving of 12 to 35 per cent in formed tubes designed for a given power transmission and for survival of one million cycles of constant pressure pulsing.

All the facts are in the booklet PB 121969, Improving Fatigue Life of Formed Stainless Steel Hydraulic Tubing by Prestressing, by C. S. Yen and B. V. Whiteson, Douglas Aircraft Co., Inc., for Wright Air Development Center, U. S. Air Force, May 1956. This 57-page booklet may be ordered from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Price is $1.50.

Building Materials Rated

PERMEABILITY OF building materials to water vapor may vary as much as 500 to 1000 per cent under a wide range of humidities, according to a report of research for the Navy.

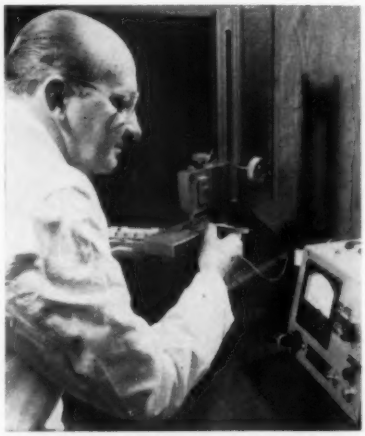
Tests were observed in uncoated cellulosic materials such as woods, fiberboards and paper. Permeability of these materials ranged from 500 to 1000 per cent. Permeability of plaster was also high. That of concrete and masonry materials was somewhat lower than wood. Various coatings, paints, papers and foils were rated for their resistance to water vapor.

The report tabulates water vapor transmission co-efficients for a wide variety of building materials. The volume, PB 131219, Survey and Analysis of the Vapor Transmission Properties of Building Materials, by H. M. Whippo and B. T. Arnberg, University of Colorado for U. S. Naval Engineering Research and Evaluation Laboratory, may be ordered from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. It contains 126 pages and the price is $3.25.

Instrument Inspection Lab

FACILITIES OF A high precision gage testing laboratory for measuring fine instruments are available to industry.

The laboratory is located in Chicago, Illinois, and is equipped to measure



This electronic testing machine checks gage blocks to one millionth of an inch

the physical dimensions and surface finishes of numerous instruments. As a representative group, the lab regularly tests plain and thread plug gages, plain and thread ring gages, involute spline wires, thread and gear measuring wires, master setting discs, etc.

For further information about the complete facilities, write direct to The Midwest Gage Laboratory, an affiliate of Size Control Company, 2500 West Washington Blvd., Chicago 12, Ill.

New Plant Engineers

R. L. Richey has been named plant engineer of the Dierks Paper Company's new plant at Pine Bluff, Arkansas. **J. C. Causey** will be his assistant. **T. J. Malone** was named master mechanic.

E. V. Collins was appointed plant engineer of the U. S. Metal Coatings Company, Inc., Middlesex, N. J. He was formerly with the Chromium Corporation of America.

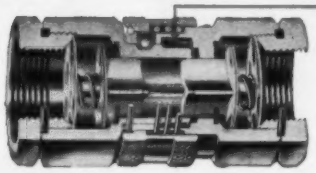
A. B. Aycock has been named plant superintendent for Southern Pipe Coating Company. He will be in charge of all pipe coating and wrapping work at the company's Doraville facilities.

WHICH SNAP-TITE QUICK-CONNECT COUPLING IS BEST FOR YOU?

SNAP-TITE "H" COUPLING . . . . . FOR HIGH PRESSURE APPLICATIONS

FOR HYDRAULIC OR AIR

"H" Coupling for high strength, higher efficiency, high-resistance to heavy line surge. Sizes: ⅛" thru 12". Bulletin No. 240

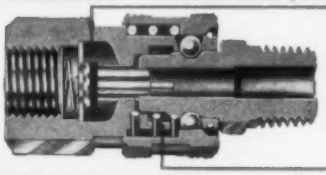


Exclusive U-packer gives a positive seal without compression set because of rubber distortion. Line pressure inside the U-packer keeps it open and forced against its metal backing—the higher the pressure, the tighter the seal.

SNAP-TITE HI-FLOW COUPLING . . . FOR LOW PRESSURE APPLICATIONS

FOR AIR AND FLUIDS UP TO 150 p.s.i.

Hi-Flow is recommended to connect small air tools to plant air system, and for low pressure fluid transfer in small lines. Sizes: ⅛" thru ¾". Bulletin No. 230

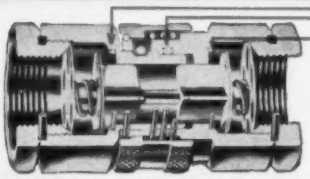


Bonded valve washer
(pat. pending on valve construction)

Exclusive U-packer

SNAP-TITE "HK" COUPLING . . . . . FOR HARD TO HANDLE FLUIDS

FOR FUMING ACIDS, ALKALIES, SOLVENTS, AND HIGH PRESSURE STEAM . . . "HK" is the only coupling now on the market for fluid temperatures from —100° F to +500° F . . . and for live steam up to 460° F. Its seals are made of Teflon for which there is no known solvent. Sizes: ½" thru 3". Bulletin No. 270



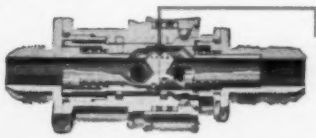
Teflon Valve Seal

Teflon Nipple Seal

Teflon Valve Seal

SNAP-TITE NO-SPILL COUPLING . . . FOR MINIMUM AIR INCLUSION

FOR AIRCRAFT, MISSILE HYDRAULIC, FUEL SYSTEMS which cannot stand air in the lines, and for transmitting fluids which *must not spill*, the Snap-Tite no-spill coupling is recommended. Bulletin No. 280

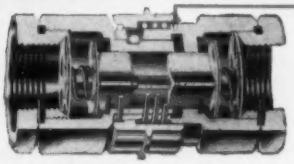


Flush valves prevent spillage, air inclusion. Snap-Tite will engineer special variations to your requirements.

SNAP-TITE "E" COUPLING . . . . . FOR VACUUM and VERY LOW PRESSURE

FOR VACUUM SYSTEMS IN THE MICRON RANGE

"E" Coupling performs in the *micron* range in the smaller sizes both connected and disconnected. Recommended, too, for gravity flow . . . U.L. approved for LP Gas. Sizes: ⅛" thru 12". Bulletin No. 250



Nipple seals in coupler by depressing the lip of the E packer and slightly compressing the body of the packer. This new E-packer gives positive seal under high-pressure, low-pressure, and vacuum.

Snap-Tite Couplings are available plain, (without valves), and with either single or double shut-off. Couplings normally furnished in alloy steel, but all (except hi-flow) are also available in brass, aluminum, or stainless steel with a variety of finishes.

SNAP-TITE, INC., UNION CITY 5, PA.

Snap-tite

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

For more facts circle 505 on Reply Card

Rolling Steel Doors

for Truck and Railroad Openings

MAHON CHAIN-GEAR OPERATOR

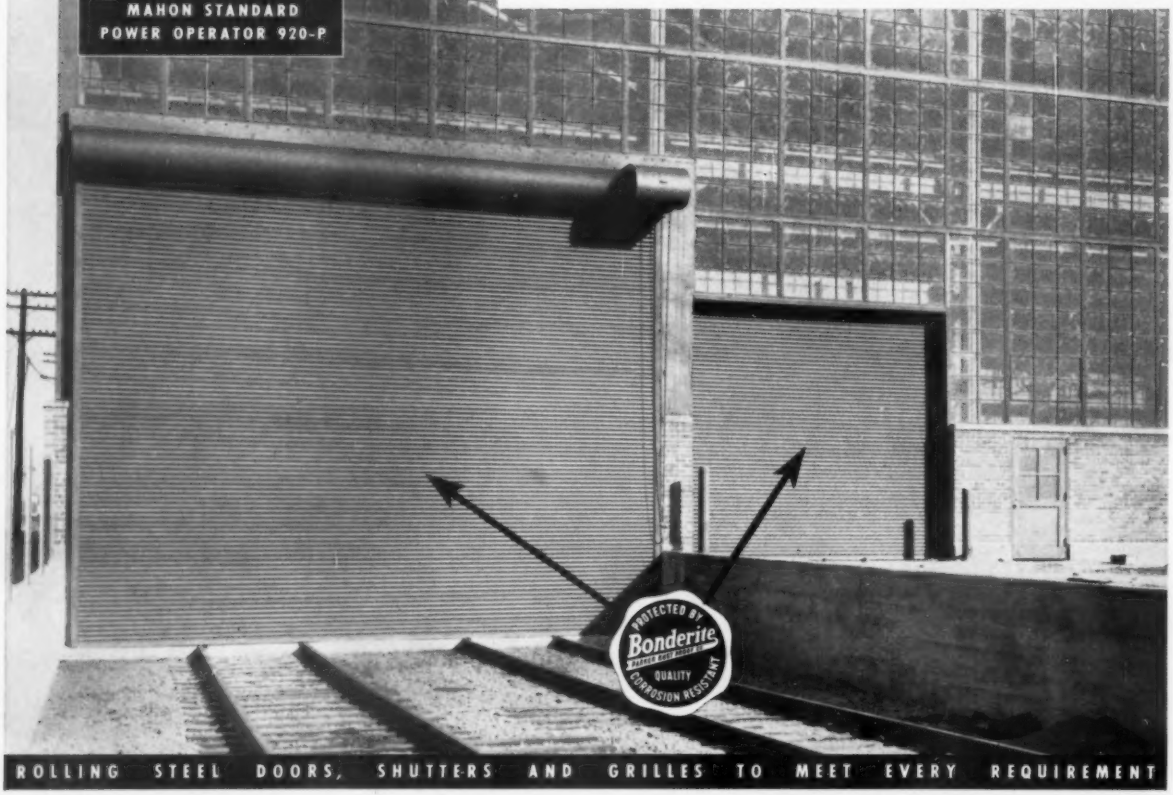
MAHON STANDARD POWER OPERATOR 920-P

In railroad and truck openings in industrial plants and shops, and in shipping and transfer dock openings, Rolling Steel Doors offer definite space saving and timesaving advantages. The vertical roll-up action of the door curtain requires no operating space either inside or outside of the opening—there are no overhead tracks to restrict headroom. And no other type of door can give you the positive security, firesafety and permanence of a good Rolling Steel Door. When you buy rolling steel doors, it will pay you to check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information, or write for Catalogue G-58.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labelled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.



ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

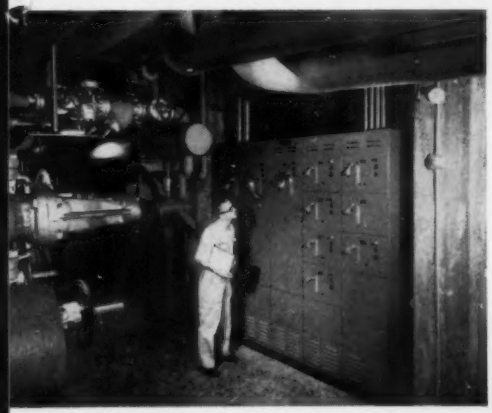
Typical Installation of Mahon Power Operated Rolling Steel Doors in a Double Railroad Opening and a Truck Opening in a Modern Industrial Plant.

MAHON

For more facts circle 506 on Reply Card

Cardinal Glennon Memorial Hospital for Children, St. Louis, Mo., occupies 4½ acres, employed 4,000,000 man-hours of labor in a three-year construction period.

One of two Westinghouse motor control centers with Type B wiring installed in hospital. Each starter has 480- to 110-volt individual control transformer for controlled circuit. J-94111-1

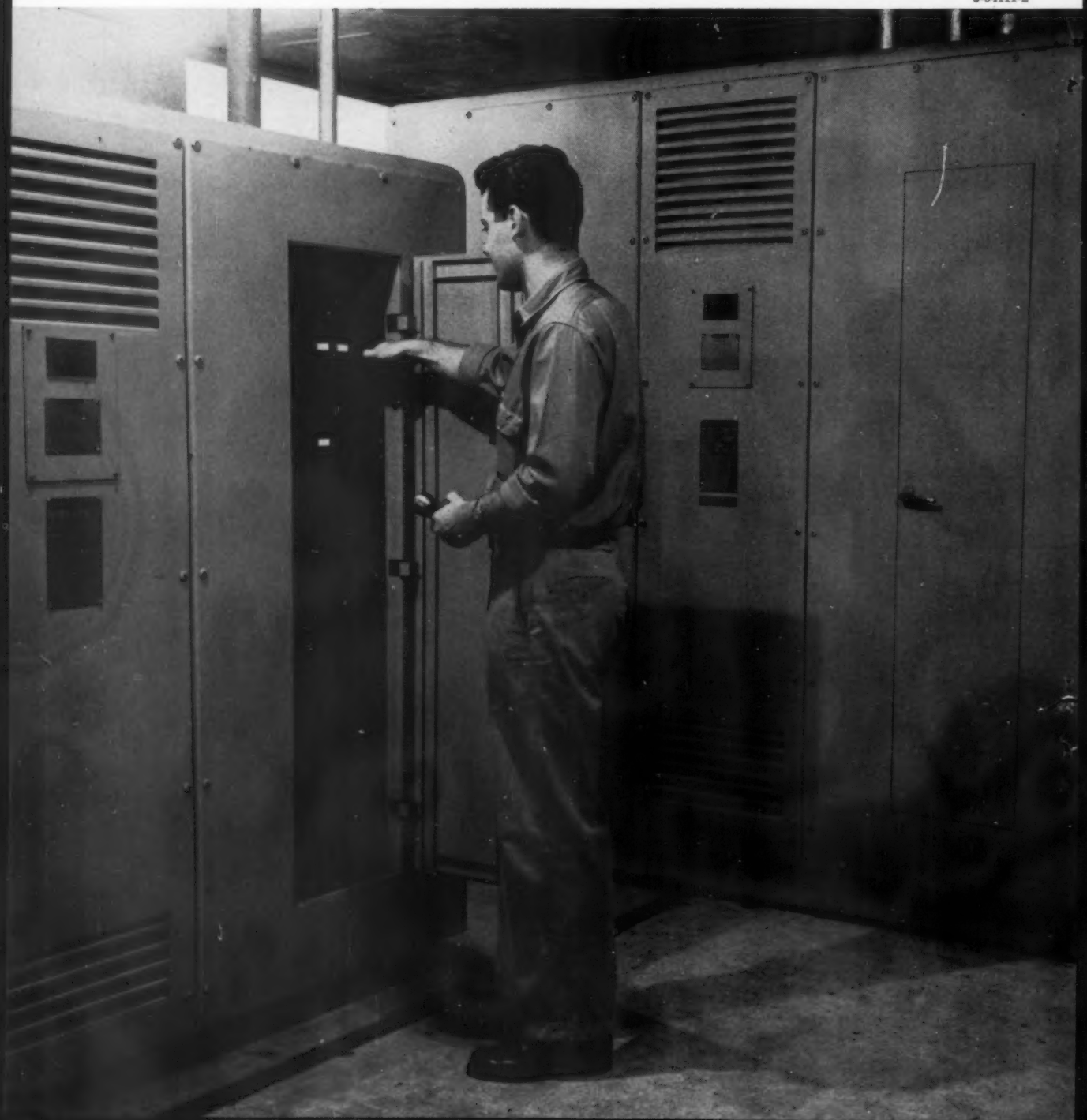


Fail-proof electrical system for children's hospital supplied by Westinghouse

YOU CAN BE SURE...IF IT'S Westinghouse

All-Westinghouse electrical distribution system was unanimous choice for long-term service

J-94111-2



Hospital conference room scene includes Norman H. Maas, Electrical Engineer for Maguolo and Quick, Architect; Joseph F. Dwyer, Manager of Hospital's Central Office and Coordinator of Building Committee; Sister Mary Vivian, S.S.M., Director of Occupational Therapy; Louis S. Sachs, S. C. Sachs Co., Inc., Electrical Contractor; (standing) W. L. Phiffer, Westinghouse Construction Sales Engineer; Paul Olschner, Westinghouse Area Sales Manager; and Walter R. Riechman, Westinghouse Electric Supply Co.

Selection of all-Westinghouse equipment for the electrical distribution system of the Cardinal Glennon Memorial Hospital for Children was made only after the many exacting requirements for hospital service were established and analyzed. The success with which the requirements are being met is shown in the quotes which follow:

The hospital manager reports, "During the 1½ years we have been in operation, the electrical distribution system has required no maintenance other than a periodic check by Westinghouse engineers. Inasmuch as this equipment was furnished by one manufacturer, we have the advantage of undivided responsibility along with a minimum parts inventory stock."

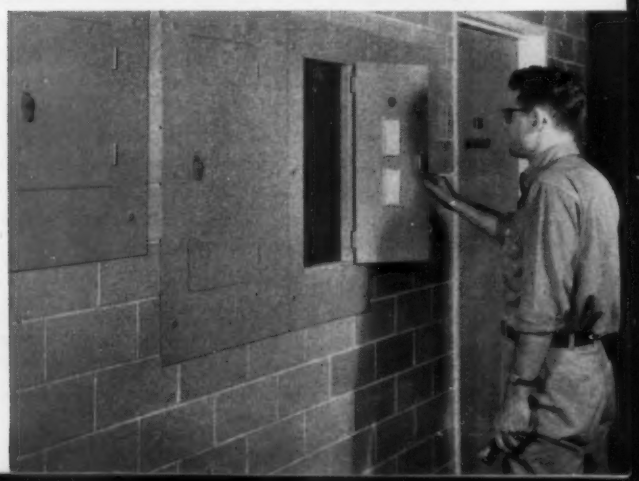
The electrical contractor adds, "The extensive cooperation by Westinghouse in scheduling shipments and in arranging larger shipments to facilitate handling provided us with the optimum flexibility we needed for the three-year construction period."

(*continued*)

YOU CAN BE SURE...IF IT'S Westinghouse

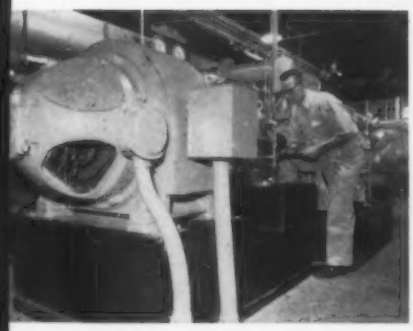
Engineers and contractors discuss Westinghouse metal-clad 5-kv indoor switchgear employing preferred-emergency incoming line transfer arrangement.

Westinghouse Type NLAB Quicklag® breaker lighting panelboards. A total of 42 lighting panelboards and 10 power distribution panelboards are installed in hospital.



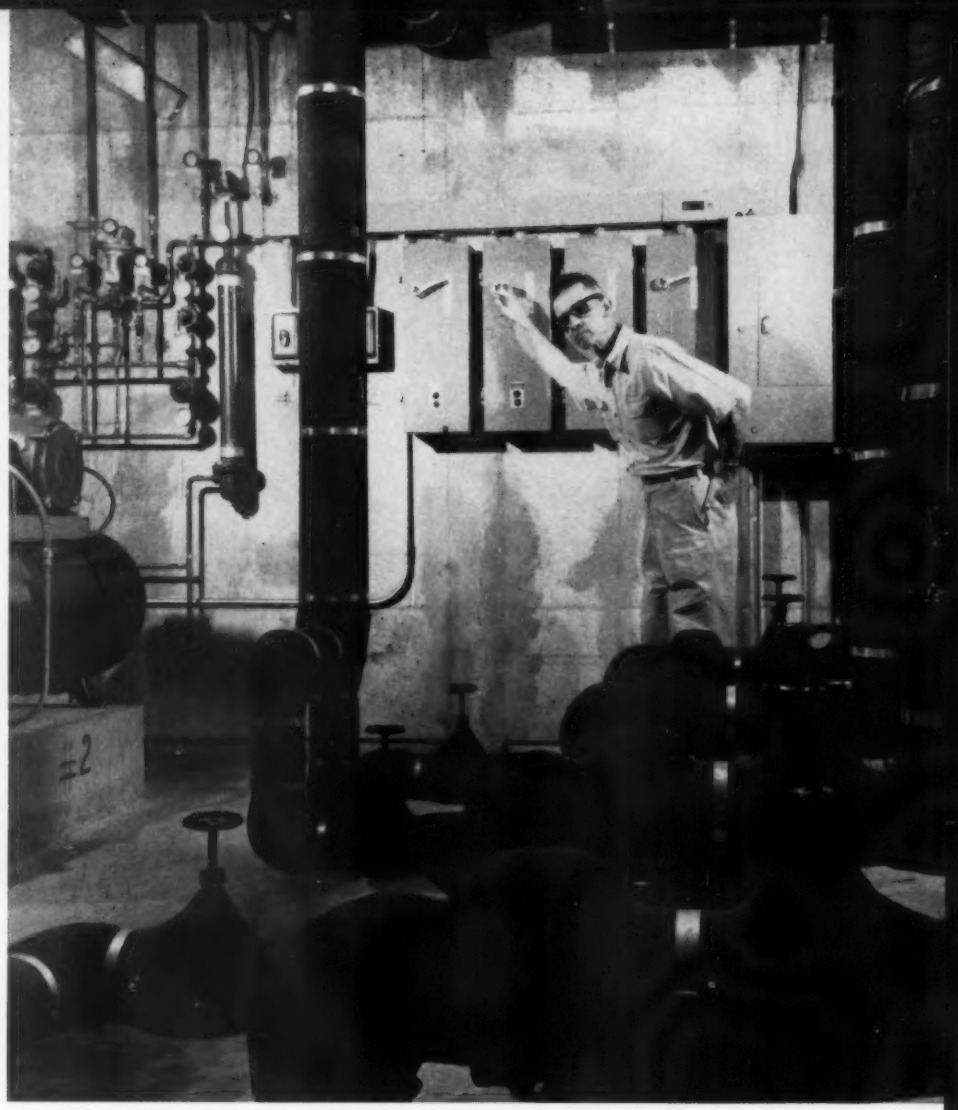
Transformer room close-up shows three of hospital's five Westinghouse dry-type self-contained power centers. 75-kva 208-volt wye to 120-volt delta ungrounded insulating power center is in foreground, and two 225-kva power centers are at rear.

J-94111-3



View of components in air conditioning compressor hook-up. In foreground is a Westinghouse 250-hp wound-rotor induction motor with Type SU double-helical-type speed increaser—1760 to 6750 rpm.

The Cardinal Glennon Memorial Hospital cares for children between the ages of one to twelve, regardless of race, color or creed.



Individual protection of vacuum pumps is provided by Westinghouse Class 11-204, Size 1 starters in NEMA 1 enclosures.

All-Westinghouse system unanimous choice for long-term service *(continued)*

The architect-engineering firm, reviewing the design and engineering which went into the hospital, says, "Our design criteria for the building was established at 100 years, and we selected all material and equipment on that basis. Because of the critical demand for absolute reliability on the electrical system in a hospital of this type, our first consideration was the duplicate primary service, with each 5000-volt feeder from a separate substation as a power failure safety factor. Our past experience with Westinghouse in working out this particular kind of transfer system in conjunction with their application engineers gave us the proved dependability we needed."

Details of some of the Westinghouse equipment used in the Cardinal Glennon Hospital are illustrated on these pages. Additional information about how Westinghouse helped meet the electrical needs of this hospital is available. Information is also offered in helping you solve your own electrical requirements. See the Westinghouse electrical construction engineer nearest you or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

Cardinal Glennon Memorial Hospital for Children
Architect-Engineer: Maguolo and Quick
Electrical Contractor: S. C. Sachs Company, Inc.
General Contractor: John B. Gutman Construction Company
Westinghouse Distributor: Westinghouse Electric Supply Company

J-94111-4

YOU CAN BE SURE... IF IT'S Westinghouse

Over 250 Pages
Westinghouse Data
in Sweet's Construction File

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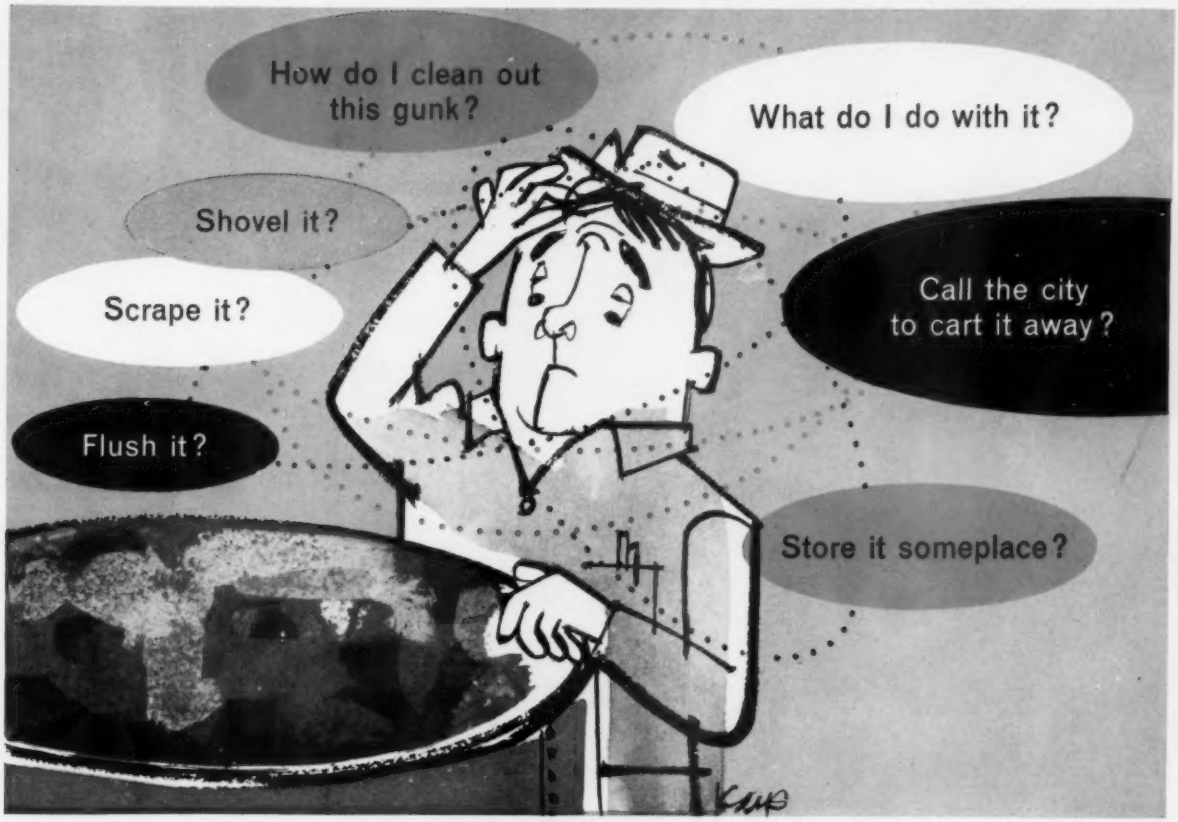


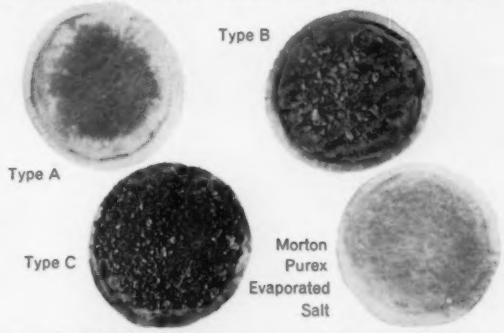
Brine tanks never need cleaning out when you use sludge-free Purex Salt

Yes, we mean never! You prevent costly shutdowns for maintenance. You save time and completely eliminate labor costs for cleaning out brine tanks. For Morton Purex Salt is 100% soluble. It will leave no accumulation of sludge—shale and sulphates—in either your brine or water-softening system.

What's more, none of your purchase price or freight bill for Purex goes toward paying for insolubles. This is an important saving, for in every 100 lbs. of ordinary salt you buy, you assume the risk of paying for up to 5 lbs. of shale and sulphates. In a 50-ton carload of ordinary salt, you may pay for as much as 5,000 lbs. of sludge. And you buy salt with "built-in" maintenance problems.

With sludge-free Morton Purex Salt, you get high-purity evaporated salt made in a controlled-particle size to prevent packing and channeling. Purex can be used in bulk wet storage systems and in the Morton Model E Brinemaker.

These filter pads (approximately 1/6 actual size) show you how much insoluble matter (sludge) you get in just 5 lbs. of various types of salt



Tests for insolubles taken from these random samples show you that Morton Purex is the only one that contains no wasteful sludge or insolubles.

For more information about Morton Purex Salt and for free, expert help on any water-softening or brine-making problem, write or wire:

MORTON SALT COMPANY
INDUSTRIAL DIVISION
Dept. PE-3-58, 120 So. La Salle Street, Chicago 3, Illinois

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Gallo wine
GALLO
YALE
MORE BOTTLES IN SAME WAREHOUSE! Filled wine bottles get a smooth, high lift on Yale K51W Trucks. Full use of air rights boosts warehouse capacity for Gallo—8,000 more bottles!

boosts production, slashes handling costs with YALE K51W ELECTRIC TRUCKS

speeds empties in-speeds cases out!

Gallo's winery at Modesto, Calif. is one of the nation's largest. Here, 32 different types of wines are produced, bottled and shipped. With production steadily increasing, Gallo management faced a common problem: outmoded, obsolete equipment—unable to handle soaring output. For a solution, Gallo called in Yale engineers. Together, they came up with a new handling system that has produced amazing results.

Today, a fleet of new, heavy-duty Yale K51W Electric Trucks unloads thousands of empty bottles a day—feeds them to 6 non-stop bottling lines. Every day these same trucks stack hundreds of full cases in warehouses and load them onto trucks and rail for shipment. Result: fast-cycle operations – big savings in storage space – handling costs at an all time low! Here's why:

Yale K51W is fast! Travels up to 6½ m.p.h. Lifts full 50 ft. a minute.

Yale K51W is short! Only 68¼" from front face of forks. Compactness makes fast maneuvering easy, lets you trim warehouse aisles for extra storage space.

Yale K51W is safe! Excellent operator visibility. Maximum stability. Dead-man control.

Yale K51W is easy to drive! Full forward visibility. Special inching control. Exclusive Yale magnetic Cam-O-Tactor for controlled acceleration. High-capacity battery for 8-hour operation without recharging.

Learn how *you* can cut handling costs with the 3,000-4,000 lb. capacity Yale K51W Electric Truck or, send for information on any of the broad line of Yale Industrial Lift Trucks – Gasoline, Electric, LP-Gas, *Worksavers*, Warehousers, Hand Trucks. Wide range of capacities. Write The Yale & Towne Mfg. Co., Philadelphia 15, Pa., Dept. A-473.

THIS IS MANEUVERABILITY! Short Yale K51W works at top speed in aisles less than 10 feet wide. 15° tilt-back improves maneuverability and speeds up operation.

FAST SHUTTLE! Yale K51W unloads this trailer truck in only 12 trips. Takes empties directly to bottling lines to meet tight production schedules.

YALE* *REG U.S. PAT. OFF.

INDUSTRIAL LIFT TRUCKS AND HOISTS

YALE & TOWNE

GASOLINE, ELECTRIC, DIESEL & LP-GAS INDUSTRIAL LIFT TRUCKS • WORKSAVERS
WAREHOUSERS • HAND TRUCKS • HAND AND ELECTRIC HOISTS

YALE MATERIALS HANDLING DIVISION, THE YALE & TOWNE MANUFACTURING CO. MANUFACTURING PLANTS: PHILADELPHIA, PA.; SAN LEANDRO, CALIF.; FORREST CITY, ARK.

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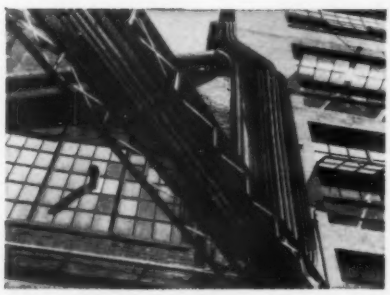
Count the

More convolutions per foot make National Electric

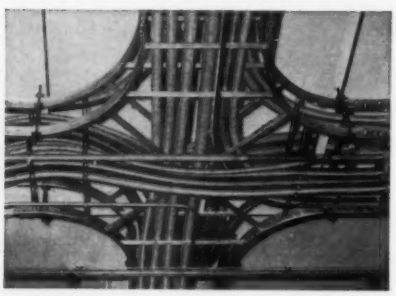
More convolutions mean greater flexibility

Bend Nepco-Lok around corners or projections indoors or out. Narrower steel strip used to make Nepco-Lok armor assures greater flexibility, speeds installation. Bondhook channel shape armor construction insures bonding and positive grounding.



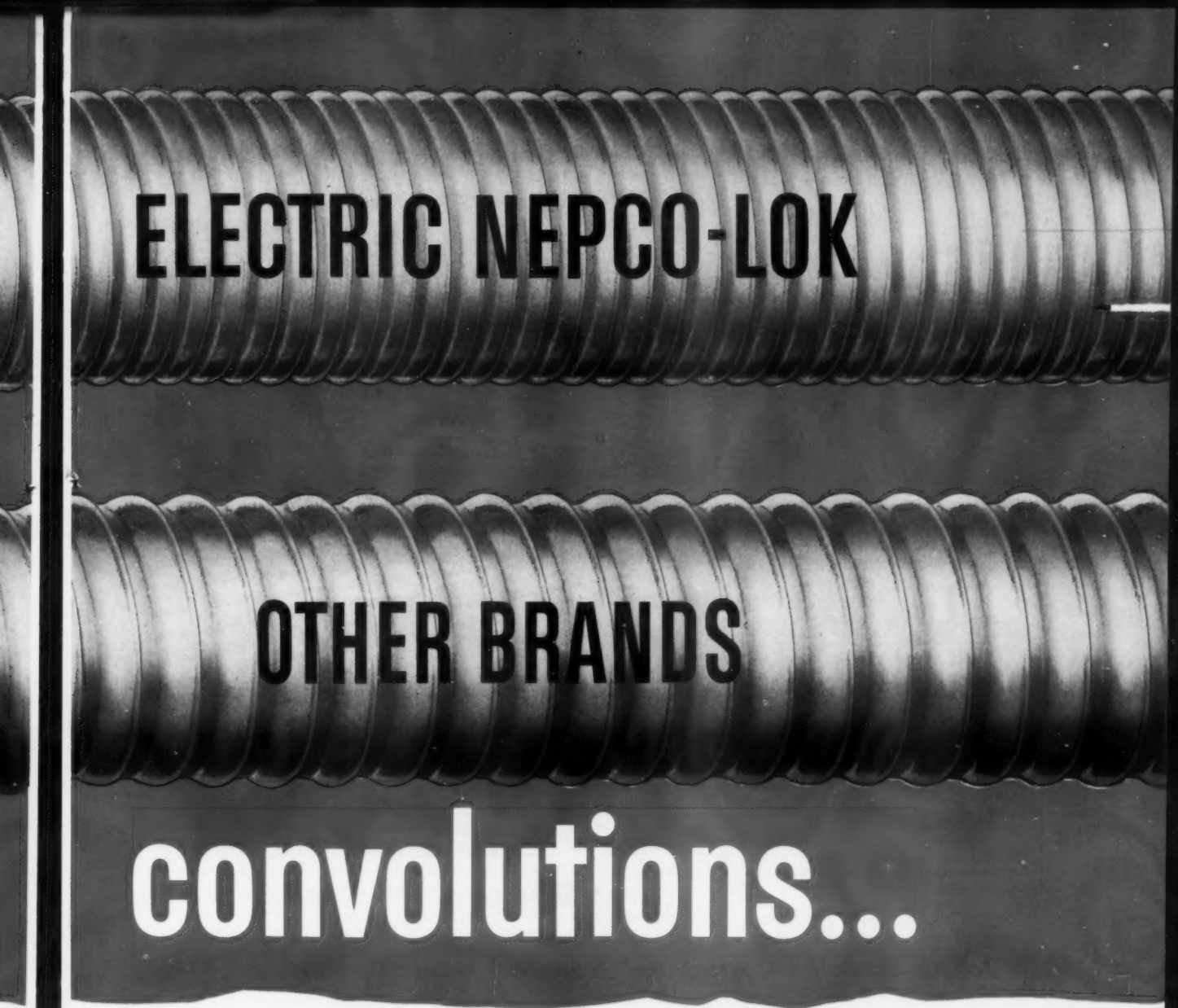
More convolutions mean fewer vertical supports

You reduce cost of vertical supports with Nepco-Lok. More convolutions mean more gripping surface for internal contact between cable and armor . . . reduces number of vertical supports needed per foot of cable.



More convolutions mean easier "pulling-in"

"Pull in" Nepco-Lok faster, easier. Reduced distance between raised convolutions provides a more uniform surface . . . reduces friction when Nepco-Lok is pulled into racks, saves installation time and cost.



Nepco-Lok the best buy in Interlocked Armor Cable

N.E. Nepco-Lok lets you get the most out of the big advantages of Interlocked Armor Cable Electrical Distribution

1. REDUCED INSTALLED COST
2. REDUCED WEIGHT
3. REDUCED SPACE REQUIREMENTS
4. REDUCED INSTALLATION TIME
5. REDUCED OUTAGE TIME

DON'T SAY ANY CABLE—SAY NE CABLE

NATIONAL ELECTRIC PRODUCTS
WIRING SYSTEMS
WIRES AND CABLES

National Electric Products

PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices

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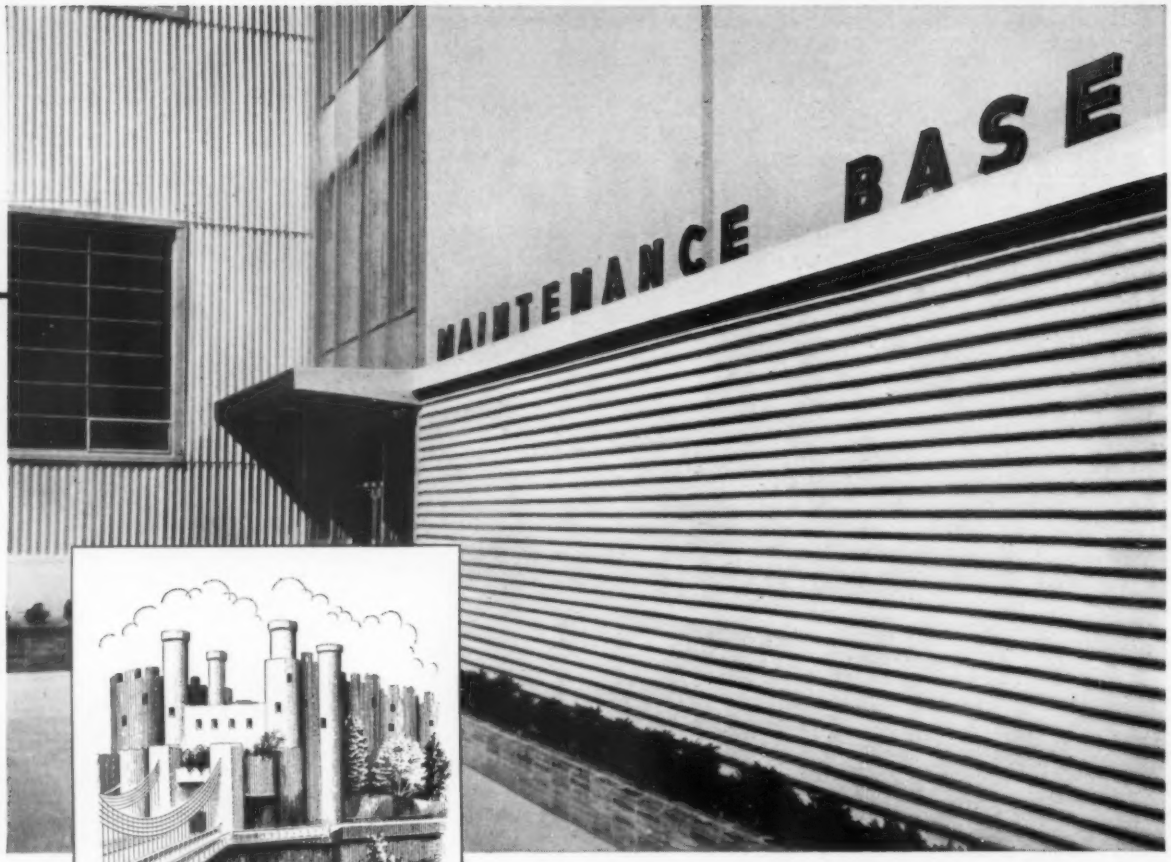
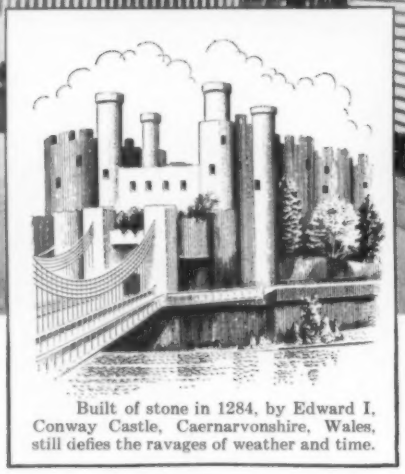




Built of stone in 1284, by Edward I, Conway Castle, Caernarvonshire, Wales, still defies the ravages of weather and time.

For Permanence, Economy and Decorative Effect

Johns-Manville Corrugated Transite® wears like stone

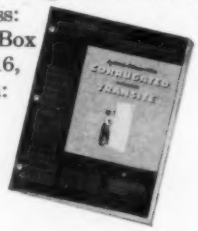
Corrugated Transite sheets, made of asbestos fibre and cement, formed under great pressure, possess unusual strength, rigidity and durability.

Like the famous old stone castles, thousands of original installations of Corrugated Transite are still giving service and protection, under conditions which destroy other forms of walls and roofing.

You save money on maintenance with this asbestos building sheet. It can't rot, can't rust, can't burn. It has high resistance to acids, to gaseous fumes, to severe temperatures, to vermin and insects.

Simple and pleasing shadow-line effects in decorative design are achieved by installing Corrugated Transite vertically or horizontally. Sheets are of a light gray color. Design possibilities can be expanded by combining Corrugated Transite with other types of building materials. Transite may be painted where desired.

For additional information on how you can have a long-lasting structure, write for new Corrugated Transite brochure. Address: Johns-Manville, Box 158, New York 16, N. Y. In Canada: 565 Lakeshore Road East, Port Credit, Ontario.



JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

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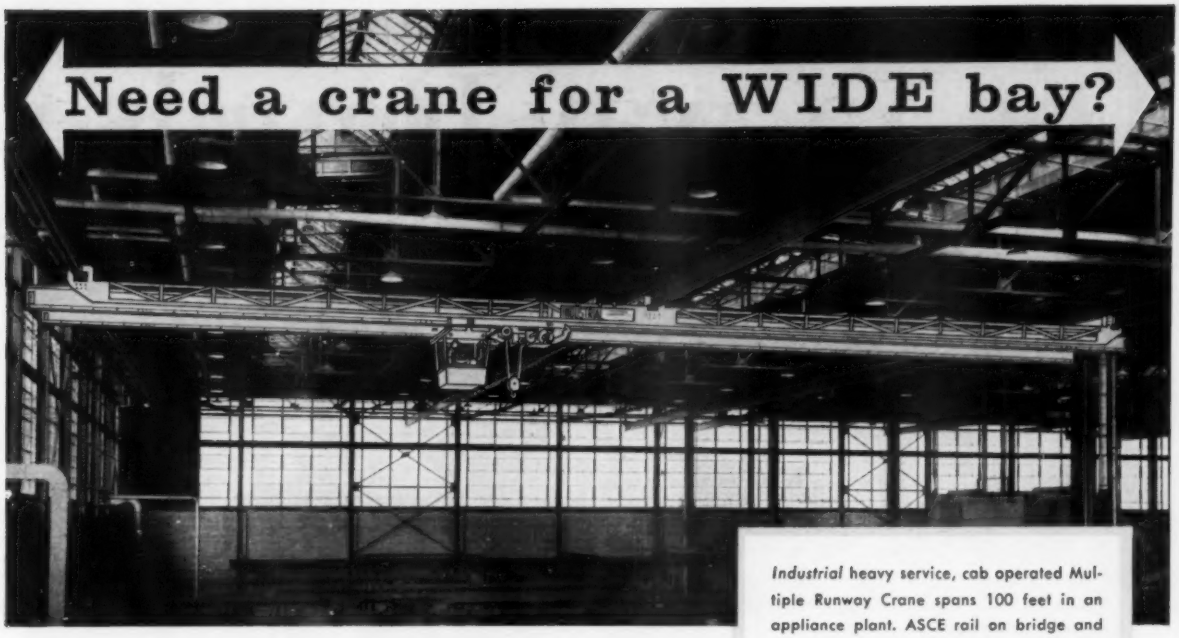


Industrial heavy service, cab operated Multiple Runway Crane spans 100 feet in an appliance plant. ASCE rail on bridge and runways for high speed and heavy service.

Industrial

Multiple runway cranes provide crane coverage over widest bays

If you are planning an extra wide shop bay requiring overhead crane service and still want to keep floor areas clear of supporting pillars, *Industrial's* Multiple Runway Crane will fill the bill. Multiple runways allow minimum depth and weight of crane bridge and eliminate intermediate supporting pillars even on extremely long spans. This member of the versatile *Industrial* crane family is ideal for warehouse or similar application where wide, unobstructed floor space is at a premium.

Trouble-free service is built into *Industrial* Multiple Runway Cranes with engineering features proved superior in *Industrial* standard high quality underhung cranes:

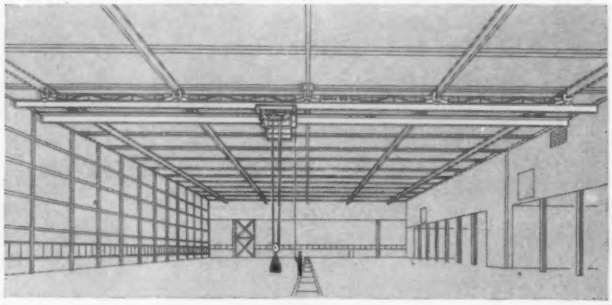
- Forged steel heat treated wheels.*
- Patented removable axles.
- Flexible couplings throughout.
- Gear drive enclosed in oil bath.
- Jig-assembled and jig-bored end trucks with large gusset plates for perfect alignment.
- Precision ball and roller bearings.
- Channel or truss type outrigger standard equipment for extra support.

*All driver wheels are heat treated for extra wear.

Industrial Heavy Service Underhung Track Section.

This heavy service *Industrial* track combines the durability of a high carbon manganese running surface with the safety of a ductile structural I-beam load-bearing member.

One of three *Industrial* floor operated, 15 ton Multiple Runway Cranes installed in an aircraft factory. Cranes span 130 feet.



To obtain fullest economy from *Industrial's* Multiple Runway Crane in new or existing buildings consult with *Industrial* engineers. *Industrial* makes many other types of overhead and jib cranes and can recommend the type and size that will best fill your needs. Send for Catalogs.

Industrial CRANES

MR1057C

INDUSTRIAL CRANE & HOIST

INGERSOLL PRODUCTS DIV. BORG-WARNER CORP.

1590 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

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The Yarway Impulse a new era in steam

. . . it began in 1935, when Yarway applied a unique principle of thermodynamics to steam traps—and the Yarway IMPULSE Steam Trap was born.

Since then over 1,225,000 Yarway IMPULSE traps have proved themselves so well in service that today many other type traps are regarded as obsolete—an understandable reason why the Yarway IMPULSE type of steam trap is being imitated.

To industry, the Yarway IMPULSE trap makes possible a new high in thermal efficiency of equipment, a new low in trap operating maintenance . . . resulting in increased production and higher profits for the user.

THE THERMODYNAMIC PRINCIPLE

This is the principle on which the Yarway IMPULSE trap design is based—that variations in temperature of water discharging through two orifices in series cause variations in pressure in an intermediate chamber between the orifices, and that these changes in pressure may be utilized to open and close the trap valve.

ONE MOVING PART

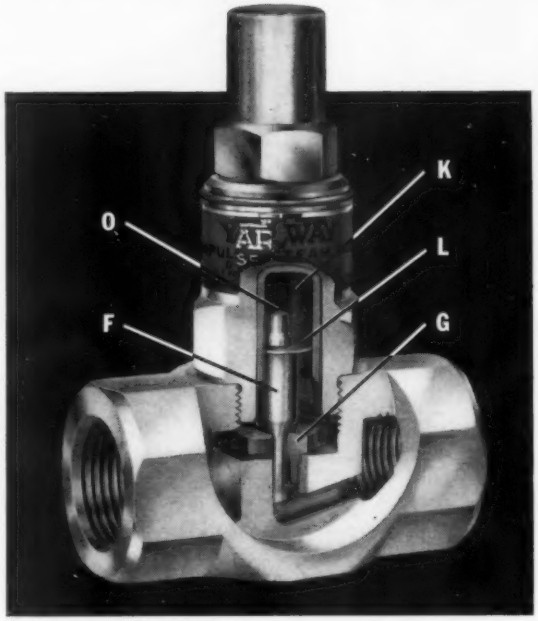
There is only one moving part in a Yarway IMPULSE trap—a small, stainless steel valve. If needed, the entire valve assembly can be replaced in 5 or 6 minutes. It is the simplest of all steam traps to service.

EQUIPMENT HOTTER, SOONER— STAYS HOT

At "start up" the little valve opens wide to discharge air and condensate continuously. This brings equipment into production in the quickest possible time. The valve then actually floats on the condensate load, opening at intervals to discharge each bit of condensate as it forms, maintaining highest, steady temperatures.

HOW IT WORKS

When steam is turned on, condensate and air flow into trap, exerting pressure on underside of control disc L, raising valve F and allowing full discharge through valve seat G.



Meantime, tiny portion of condensate flows around control disc L into control chamber K and discharges through orifice O in the center of valve. This keeps pressure low in chamber K until condensate approaches steam temperature. Some of this hot condensate now begins to flash in control chamber and on downstream side of control orifice O. This chokes the flow through orifice O and pressure builds up in chamber K, snapping valve F shut.

When condensate cools slightly, flashing stops, relieving pressure in K and permitting valve to re-open. In practice, valve opens and closes at short intervals on ordinary condensate loads, remains wide open on heaviest condensate loads. Steam equipment is always kept at its peak operating temperature.

PLUS ADVANTAGES

Other advantages like the following have wide appeal to hundreds of thousands of users:

- Small size and light weight
- Easy, low cost installation
- Minimum maintenance
- Non-freezing
- Stainless steel construction
- No adjustment of valve or seat needed for any pressure
- Low initial cost

started trapping...

A YARWAY IMPULSE STEAM TRAP TO MEET EACH TRAPPING REQUIREMENT

Research and development in the Yarway Steam Laboratory, combined with intensive field testing, have produced a line of steam traps—*all* of the Yarway IMPULSE type . . . to specifically and efficiently meet each of the following classes of trapping service:

Normal requirements for pressures up to 600 psi are satisfied by Yarway Series 60 and 120 IMPULSE Traps in six sizes, ½″ to 2″.

Light loads for pressures up to 600 psi are handled most efficiently by the ½″ Yarway No. 20-A and No. 120-A IMPULSE Traps.

Heavy loads for pressures to 600 psi call for the extra high capacity Series 40 Yarway IMPULSE Trap, available in five sizes, ½″ to 2½″.

Highest pressure and marine requirements up to 2500 psi are met by the Yarway Integral-Strainer IMPULSE Trap, in six sizes, ½″ to 2″, flanged, screwed and socket weld types.

NATIONALLY STOCKED, SOLD AND SERVICED

Over 270 Industrial Distributors, conveniently located in every industrial area, stock and sell Yarway IMPULSE Steam Traps . . . and over 35 Yarway field engineers throughout the country are available to help you select the right steam trap for the service and insure maximum efficiency on the job.

For free copy of new bulletin "*The Why and How of Steam Trapping*," write:

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.

YARWAY *impulse*®

...a good way to specify steam traps

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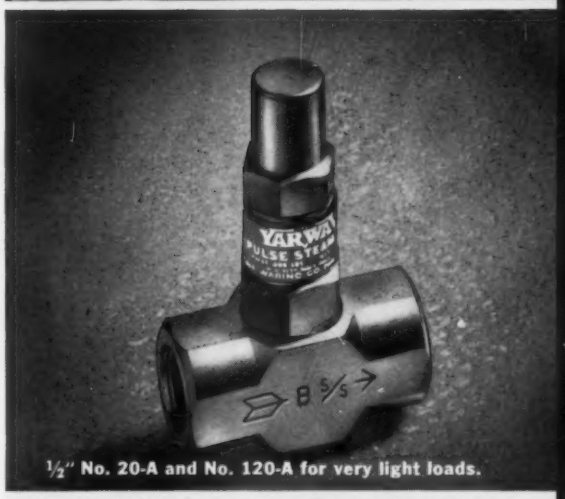
Series 60 and 120 for normal requirements.



½″ No. 20-A and No. 120-A for very light loads.

Series 40 for very heavy loads.

Integral Strainer Impulse Traps for highest pressures and marine use.

Mister, you're looking at a panelboard that's really built for Heavy Duty!

The heart of this QMB Saflex Distribution Panelboard is the quick-make, quick-break, horsepower rated switch unit.

It's loaded with features—

- **Each switch unit individually enclosed in heavy gauge steel**
- **Dead front construction**
- **Heavy duty cast operating handle**
- **Double-spring mechanism insures positive opening under full load**
- **Visible blades for maximum safety**
- **Positive pressure fuse clips and switch jaws assure maintenance-free connections**
- **Cover interlock prevents unauthorized access but makes normal maintenance easier**

QMB Saflex Distribution Panelboard

Here's a panelboard that's built for the tough jobs! But it goes a lot further than rugged construction. It's designed with plenty of space for easier wiring and maintenance.

Write for...

Bulletin S D-29 for further information
Address: Square D Company,
6060 Rivard Street,
Detroit 11, Michigan

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

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BULLETINS just released and of immediate plant interest

INSTRUMENTS, CONTROLS

101 Controls for Automation—Automation Controls Catalog 1957-58, 44 pp, groups together a wide selection of automatic controls most commonly used in designing automatic systems. Includes such items as counting devices, switches, electric valves, actuators, relays, limit controls, time switches and accessory equipment which can be used as building blocks in selecting components for tailoring system. General Controls Co.

102 Automatic Control Equipment—Detailed information, technical data and prices on all types of automatic electrical control equipment is featured in 64-pp Catalog 18. Applications, construction details, engineering information and operating features are included, as well as general data and design specifications. Indexed in four sections, covering automatic transfer switches, contactors, special controls and timing devices, bulletin covers a wide range of equipment for timing and control needs. Zenith Electric Co.

103 Guide to Thermometers—Catalog C60-2, 56 pp, describes complete line of Brown rectangular case filled system thermometers. These indicators, recorders, transmitters, and electric or pneumatic control instruments are covered as to design, function. Vapor actuated, gas actuated, and mercury actuated thermometers and thermal systems are listed and explained, along with separable wells. Minneapolis-Honeywell Regulator Co.

104 Flow Meters—Offered in 22-pp Bulletin F1607 are engineering data on differential pressure type flow meters, including basic information and theory on the selection, sizing and installation of the various types of primary devices. Approved installation practices for gases, liquids and steam are explained and illustrated. Equations for calculating throat diameters and flow rates are given. The Bristol Co.

105 Temperature Regulators—Bulletin 1012, 6 pp, presents two series of steam regulating valves with pilots for both fast and slow heating exchangers. Describes types suited for instantaneous heaters (with pilots which handle heater pressures to 50 psi), for slow acting heaters, etc. Selection tables and line drawings of typical applications are shown. Spence Engineering Co., Inc.

106 Data on Pyrometers—Bulletin GEA-6650, 8 pp, explains features of company's pyrometers with emphasis on such design features as printed circuits, lead length compensation. Standard scale ranges are listed. Includes application information on control forms, principles of operation of the basic instrument and controller. General Electric Co.

107 Pneumatic Instruments—Catalog 510, 16 pp, describes indicating controllers for automatic control of pressure or temperature, transmitters for pressure or temperature indication, and receiver gages in various designs, ranges and degree of accuracy and sensitivity. Tables of ranges, element characteristics, and bulb lengths are included. United States Gauge, Div., American Machine and Metals, Inc.

108 Mill Regulator—Bulletin K-2503, 6 pp, describes a dual-circuit mill regulator which provides precise regulation of line speed, voltage and tension for continuous-process industries. Photos, drawings and text detail features and explain operation. Reliance Electric and Engineering Co.

109 Tank Gaging Systems—Bulletin 463A describes a line of remote and direct reading tank contents gaging systems. Advantages of the various gages are detailed and photos, drawings and a list of liquids successfully gaged given. The Liquidometer Corp.

110 Industrial pH Equipment—Eight-pp Bulletin 5400 gives detailed descriptions and specifications for industrial pH instruments, electrodes and accessories manufactured by the company. Brochure is profusely illustrated with photos and detailed drawings. Process Instruments Div., Beckman Instruments, Inc.

LUBRICATION

111 Centralized Lubrication—The application of centralized lubrication to industrial machines or vehicles is detailed in 12-pp Catalog 34-28A. Analysis of machine bearings is among subjects discussed, as are selection of lubrication interval, selection of system components, selection of appropriate lubricant, installation procedure. Alemite Div., Stewart-Warner Corp.

112 Lubrication Equipment—Filled with dimension drawings—many in actual size—20-pp Catalog 92 describes company's line of lubricant application devices. Also presented are features of lubrication fittings, grease guns, centralized power lubrication systems and accessories. A selection chart is included. Lincoln Engineering Co.

113 Plug Valve Lubricants—Reference Book 39—Section 5A, 16 pp, describes company's plug valve lubricants and lubrication accessories. Standard lubricant table gives detailed description and extreme temperature range of each lubricant. A list of suggested lubricants is also included. Homestead Valve Mfg. Co.

MECHANICAL POWER TRANSMISSION

115 Shaft Mounted Drives—Bulletin 7100, 32 pp, describes all-steel, helical gear, shaft mounted drives for applications in the range from ½ to 50 hp and from 420 to 5 rpm output speed. Covers unit design and construction and provides suggestions on using the drives. Also given is information on how to select proper size and ratio of unit, sheave and belt. Includes data on accessories. The Falk Corp.

116 Variable Speed Drives—Twelve-pp Bulletin 550 describes principle of operation, features and operating advantages of company's variable speed drives. Selection tables are included along with dimensional diagrams. Graham Transmissions Inc.

117 Adjustable Speed Drive—Bulletin 2000, 12 pp, describes the Selec-A-Spede, a variable-voltage d-c drive that uses a-c as its power source. Applications such as machine tools, metal processing, textile, paper making, test stands, and conveyors are discussed and illustrated. Also covers installation, performance data. The Louis Allis Co.

118 Variable Speed Drives—Bulletin 195, 8 pp, covers company's line of variable speed drives, illustrating several Speed-Trol motor applications and providing selection information. Design advantages are explained and illustrated. Also described are automatic and mechanical remote controls available. Sterling Electric Motors, Inc.

119 Gears, Speed Reducers—Latest information on stock gears, speed reducers, sprockets and chains, flexible couplings, universal joints, collars and pillow blocks is presented in 80-pp Catalog 100. Special charts for selection of speed reducers and stock gears allow choice to be made simply and easily. Another feature is use of color coding. Individual sections are assigned distinctive colors and a color-key appears on front cover for quick location of material. Charles Bond Co.

On pages 251-252 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

120 Electric Brake Application—Bulletin GET-2770, 8 pp, provides detailed technical data on the application of company's complete line of a-c and d-c brakes. Applications, performance, operation and characteristics of solenoid-operated, Thrustor-operated, and magnet-operated brakes are discussed. In addition, 16 performance curves are included. General Electric Co.

121 Flexible Couplings—Bulletin 10100, 8 pp, features five tables which short-cut the usual engineering calculations involved in selection of flexible couplings. Advantages of company's line of flexible couplings are fully detailed. T. B. Wood's Sons Co.

122 Miniature Couplings—Tiny power couplings, smaller than a car ignition key in length, and with a circumference less than that of a half-dollar, are described in Bulletin MC-100. Advantages are detailed and material specifications included. Thomas Flexible Coupling Co.

BULLETINS

(Begins on page 21)

VALVES

123 Valve Selection Guide—Incorporating cross-section illustrations, 56-pp Catalog 58-59 provides comprehensive characteristics and data to aid in selection and application of valves. These valves are rated for oil, water and air pressures ranging from 0 to 250 to 0 to 10,000 psi. in four-way, three-way, shut off and diverter flow patterns, manual and solenoid. Other sections contain graphs determining means of calculating pressure drop, discharge and velocity of liquids. Book also summarizes probable causes and remedies for more difficult maintenance problems. Barksdale Valves.

124 Valves, Controllers—Bulletin S-730-1, 8 pp, describes company's line of automatic valves and controllers, including pressure-reducing and regulating valves, relief valves, back pressure valves, controllers, control valves, differential regulators, oil pumping units, governors, combination regulators, control systems and temperature regulators. Size and capacity data included. A. W. Cash Co.

125 Sliding Gate Valves—Six-pp Bulletin J-160 gives information on sliding gate pressure reducing valves designed for dead end shut-off on all fluid services. Describes the valves' features, design improvements and method of operation. Contains flow capacity charts, dimensions, control ranges and material specifications. Jordan Industrial Sales Div., OPW Corp.

PUMPS, COMPRESSORS

127 Heavy Duty Pumps—Twelve-pp Bulletin 1157 presents company's Triplex pumps for use where high pressures (to 20,000 psi) and temperatures (in excess of 500 F) are required. Applications include operation of hydraulic test equipment, lubricating systems, others. Provides complete description of the pumps, along with ratings. Pictures some installations. Kobe, Inc.

128 Rotary Pumps—Twelve-pp Bulletin TLP-57 presents company's Twin-Lobe rotary positive displacement pumps, featuring simplicity, efficient operation and ability to handle a wide range of products. Provides analysis of performance characteristics, graphs on operating speeds and ranges, corrosion resistance charts, data on seals etc. Manton-Gaulin Mfg. Co., Inc.

129 Vertical Pumps—Bulletin 726.2, 12-pp, describes company's line of heavy duty vertical centrifugal sump and process pumps. Includes specifications, sectional views, performance ratings, and a chart of construction materials for interchangeability. Goulds Pumps, Inc.

130 Metering Pump—Bulletin 1157 describes a metering pump with diaphragm liquid end. Specifies capacities, pressures and materials of construction of the leakproof pump for metering corrosive, obnoxious or toxic chemicals. Also discusses such features as mechanical actuation for correcting volume of hydraulic fluid between each stroke. Milton Roy Co.

131 Air Compressors—Bulletin SG-1 describes the entire line of unit-type and stationary-type air compressors manufactured by the company. Photos and descriptive data on seven basic models are given, along with information on design, speeds, methods of lubrication, and working capacities. Le Roi Div., Westinghouse Air Brake Co.

HOSE AND FITTINGS

132 Teflon Hose—This industrial catalog supplement describes company's Teflon 140 hose and industrial reusable fittings. Illustrates hose and fitting and component parts, and includes design specifications and suggested applications. Titeflex, Inc.

133 Vinyl Plastic Hose—This 8-pp catalog describes advantages of an industrial hose of specially compounded vinyl, designed specifically for pneumatic and hydraulic applications where working pressures up to 125 psi are encountered. Includes technical data, as well as illustrations of the various types of hose and fittings and pictures of typical applications. Hoffmann Engineering Co.

134 Fittings for Hydraulic Hose—Catalog 4440, 8-pp, describes reusable Hoze-lok fittings for use with rubber covered wire braided hydraulic hose in sizes from 3/16 through 1⅛ in. ID. Lists hose and hose assemblies as well as giving instructions on how to make up assemblies. Parker Fittings & Hose Div., Parker-Hannifin Corp.

VENTILATING AND AIR CONDITIONING

135 Air Engineering—Eight-pp Bulletin 135, on air engineering for the process industries, offers a collection of brief descriptions on apparatus manufactured by this company. Covers such functions as heat removal by the air method in process cooling; heat treating; refrigeration; air liquefaction; heat and moisture control; low temperature conversion, others. Apparatus includes after-coolers, air conditioners, liquid coolers, heat exchangers, condensers, others. Niagara Blower Co.

136 Electric Unit Ventilator—Descriptive bulletins and sample architectural specifications on company's automatic electric unit ventilator are among the new publications recently announced as available. Complete details and illustrative material included. Edwin L. Wiegand Co.

137 Fan Testing, Rating—"Prototype fan testing and computations for testing fan equipment" is the subject of Bulletin 151-57. Tells how prototype fans are tested to obtain accurate performance characteristics for a complete series of fans of the same or larger sizes. Also covered are definitions of test ratings, deviations from the fan laws. Air Moving & Conditioning Association, Inc.

138 Certified Ratings—Technical Bulletin 153-57 gives details of an industry-wide program designed to help specifiers of air moving equipment—centrifugal, axial and propeller fans, and power roof ventilators—to identify air moving equipment certified to perform according to published performance ratings based on official tests. Typical test set ups and performance curves for fans are included. Air Moving and Conditioning Association, Inc.

139 Duct Design Manual—This 24-pp publication is devoted to design of ducts for air high velocity heating and air conditioning systems. Contains many performance tables, some compiled for the first time. Correct design procedure is explained by step-by-step computations on two work sheets for a multi-story building. Schematic layouts are shown. Information on duct construction and duct installation is given. Anemostat Corp. of America.

MAINTENANCE

140 Protective Coating—Bulletin MS-57, 16 pp, presents features, properties and characteristics of Mono-Seal, a super-tough, plastic type protective coating. Includes data on application, drying times, coverage and surface preparation. A "value analysis" section provides a guide for economic selection of coating materials by analyzing coverage, surface-life, surface preparation, loss of operating time, and refinishing cycles. Mono-Seal Products.

Reader Service Cards for ordering bulletins are on pages 251-252. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

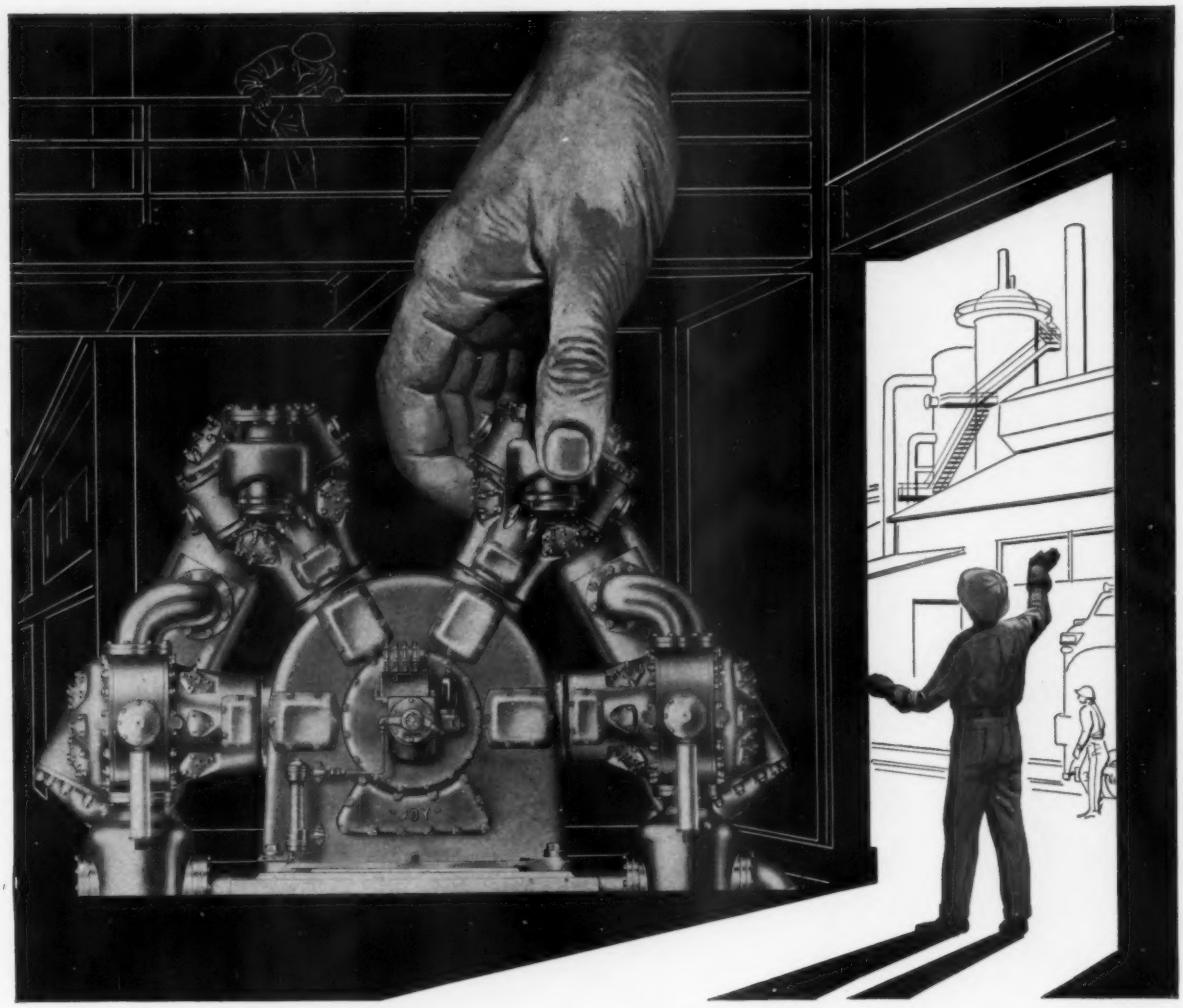
141 Floor-Maintenance—This illustrated folder describes "everything for floor care"—scrubbing, waxing, polishing, and mopping equipment; also waxes, sealers, and cleansers. Includes recommendations for use and packaging information. Among items featured is a low-built, motor-weighted floor maintenance machine in several sizes. Finnell System, Inc.

CONSTRUCTION

142 Structural Glass—Catalog 58-1 contains essential data on company's line of rolled, figured and wired glass for a variety of industrial applications. Advantages and important functions are described, and light distribution tables and specifications are included. Mississippi Glass Co.

143 Movable Walls—Described in this 6-pp brochure is a movable interior wall system, called Horizon, designed to permit custom interior walls at less than custom cost. Bulletin illustrates system's movability and selection of panel materials, inserts, modules, post shapes, glass patterns and panel colors. E. F. Hauserman Co.

(More Bulletins on page 253)



SET A 500 TO 1000 HP AIR COMPRESSOR IN THE CORNER OF YOUR PLANT . . . *almost as easy as this*

IF YOUR EXPANDING PLANT FACILITIES are requiring more compressed air . . . *and* putting a squeeze on plant space, here's the answer . . . the *new* Joy WN-224 compressor. Because of its compact semi-radial design, the WN-224 is delivered as a package—completely assembled—ready to go. Just bolt it down, connect power, water, and air lines . . . and you're ready for long, continuous service. This is the only true "package" compressor available in these capacities . . . 2418 to 6048 cfm . . . horsepower ratings from 350 to 1000.

AND THE WN-224 SOLVES YOUR SPACE PROBLEMS . . . it can be installed where no other compressor of equal capacity will fit. Instead of long, horizontal units on massive foundations, the Joy WN-224 has four cylinders arranged semi-radially around the frame. This compact, balanced arrangement assures smoother running, gives longer service with far less maintenance. Get the whole story on the WN-224 from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WBW I 6666-179

Write for FREE Bulletin 179-15

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

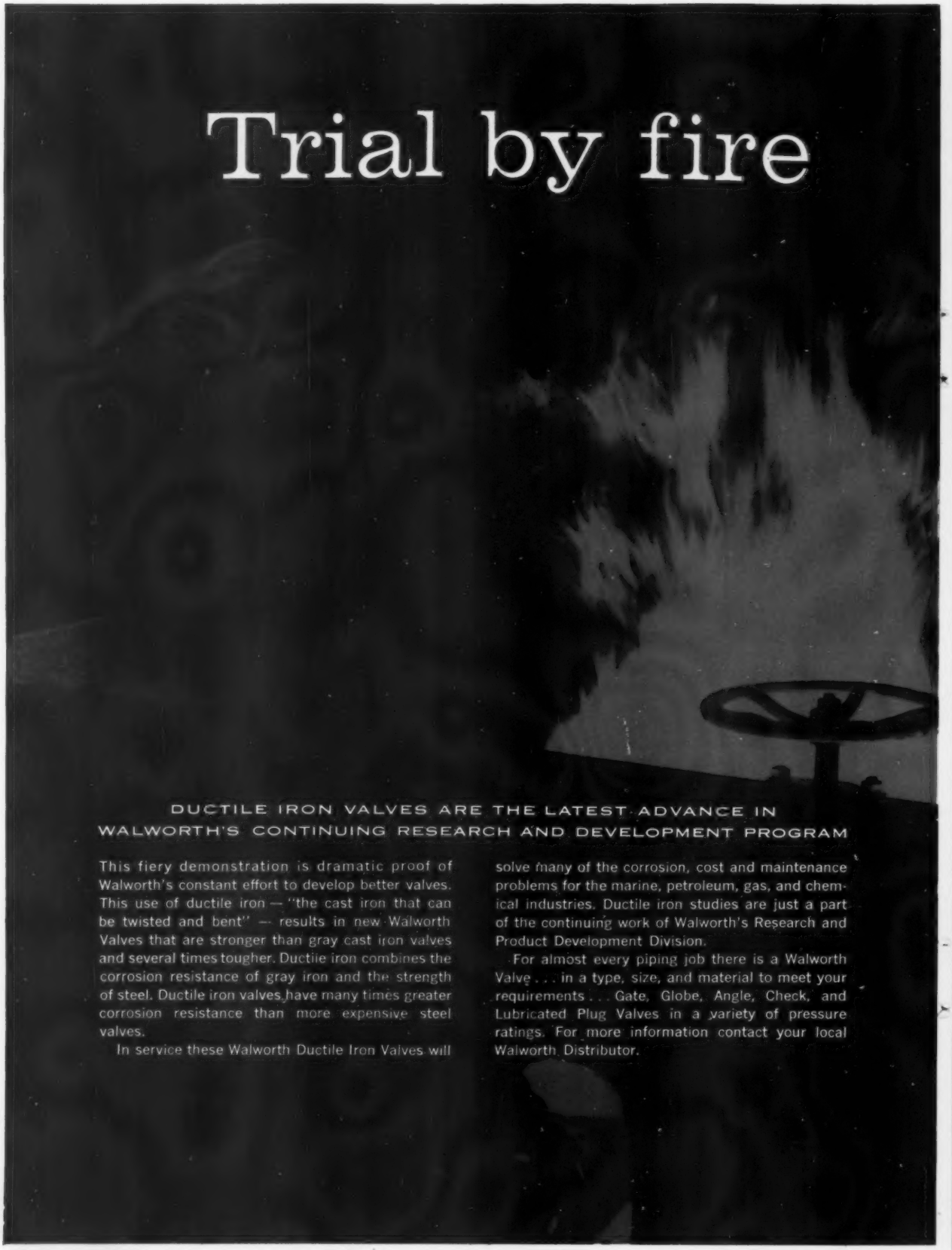
Industrial Compressors

Conveyors

Electrical Connectors

Fans and Blowers

For more facts circle 515 on Reply Card



DUCTILE IRON VALVES ARE THE LATEST ADVANCE IN WALWORTH'S CONTINUING RESEARCH AND DEVELOPMENT PROGRAM

This fiery demonstration is dramatic proof of Walworth's constant effort to develop better valves. This use of ductile iron — "the cast iron that can be twisted and bent" — results in new Walworth Valves that are stronger than gray cast iron valves and several times tougher. Ductile iron combines the corrosion resistance of gray iron and the strength of steel. Ductile iron valves have many times greater corrosion resistance than more expensive steel valves.

In service these Walworth Ductile Iron Valves will solve many of the corrosion, cost and maintenance problems for the marine, petroleum, gas, and chemical industries. Ductile iron studies are just a part of the continuing work of Walworth's Research and Product Development Division.

For almost every piping job there is a Walworth Valve . . . in a type, size, and material to meet your requirements . . . Gate, Globe, Angle, Check, and Lubricated Plug Valves in a variety of pressure ratings. For more information contact your local Walworth Distributor.

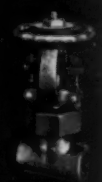
WALWORTH SUBSIDIARIES: ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO.

In the first stage of thermal shock test, oil fire and gas flame heat a 6-inch Walworth Gate Valve constructed of ductile iron to a red hot temperature of 1350°F.

Now the Walworth Valve is quickly chilled with streams of water. A cast iron valve could shatter under such a drastic and rapid change in temperature.

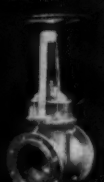
Slightly scorched, the valve keeps its shape and dimensions despite the ordeal and is completely operable. The test proved that, under these conditions, Walworth ductile iron valves have a thermal shock resistance equal to that of more expensive steel valves.

NEW WALWORTH PRODUCTS AND DEVELOPMENTS



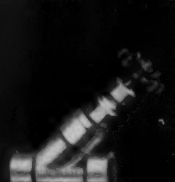
FORGED STEEL WEDGE GATE VALVES

. . . for water, steam, gas, and air service to 850°F. Oil or oil vapor to 1000°F. OS & Y types. Screwed or socket welding ends. Bolted or union bonnets. Sizes from ¼ to 2 inches.



FABRICATED PULP STOCK VALVES

. . . for lines carrying pulp stock in varying concentrations, slurries, and other fibrous materials in suspension. All-welded stainless steel construction. Corrosion resistant. Sizes from 3 to 30 inches.



PVC VALVES AND FITTINGS

...made of rigid, unplasticized polyvinyl chloride. Highly resistant to chemical attack. Non-toxic, Non-aging. Extremely low flammability. Sizes from ½ to 4 inches.

WALWORTH

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

SOUTHWEST FABRICATING & WELDING CO., INC. • M&H VALVE AND FITTINGS CO. • WALWORTH COMPANY OF CANADA, LTD.

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from PLANS to fully equipped PLANT...

broom

and ready for production

...COMPLETE, by

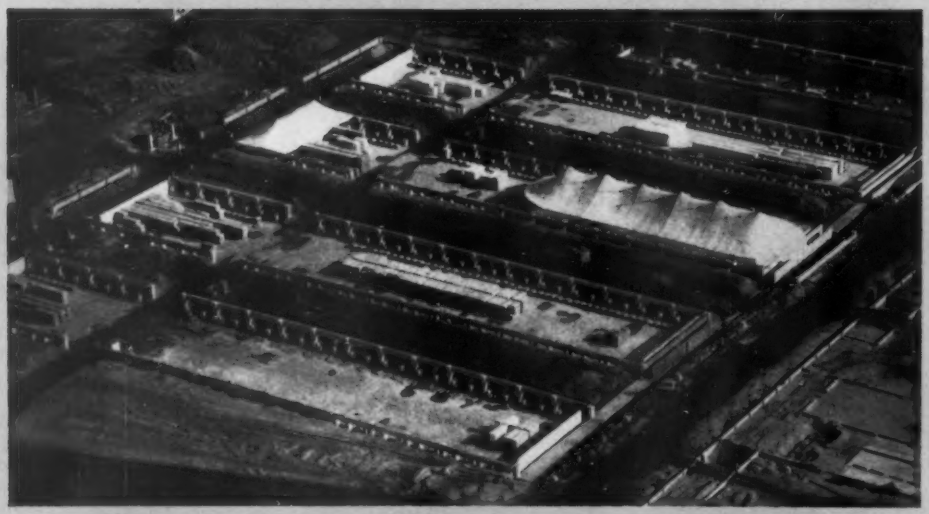
F. H. McGRAW & COMPANY

Engineers and Constructors to American industry

780 Windsor Street, HARTFORD, CONN.

NEW YORK • PITTSBURGH • CHICAGO • MONTREAL

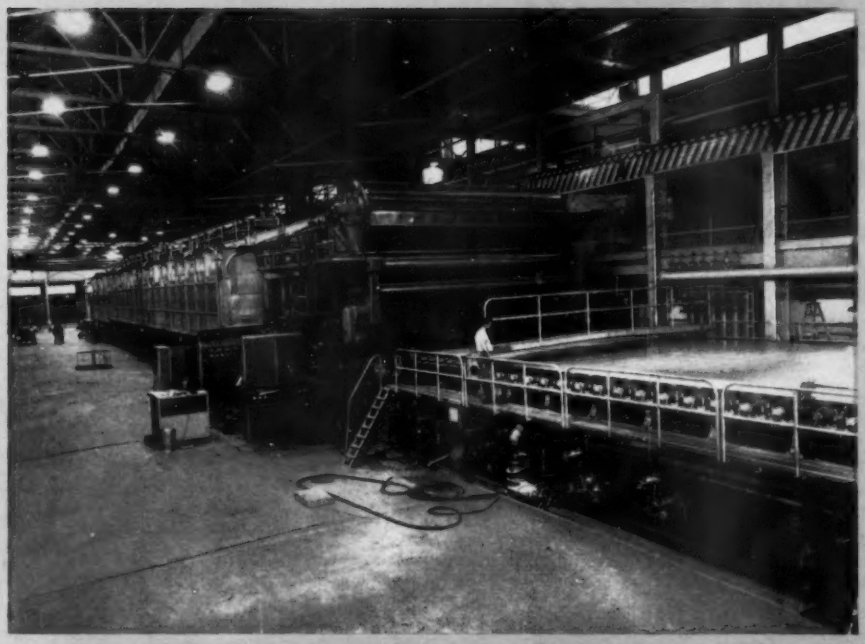
PLANT CONSTRUCTION— Bricklaying crews work under canvas during severe weather amid sprawling foundations of a section of the $150-million aluminum plant now being built near Hannibal, Ohio, by F. H. McGraw & Company for Olin Revere Metals Corporation and Olin Mathieson Chemicals Corporation. Six million cubic yards of earth were moved to dig emplacements for the Hannibal plant foundations.



clean

F. H. McGRAW & COMPANY takes on the whole job or any part of the job, from first rough plans through design, engineering, plant construction and mechanical installation, down to the last details of piping, painting and landscaping. A McGraw-built plant is delivered *broom clean*—ready for production.

McGraw men, methods, materials and machines have built an outstanding record of problem-solving construction, minimum interference with current production and on-time (or before-time) delivery. We'd be pleased to have a McGraw engineer consult with you on your construction or mechanical erection needs—with no obligation, of course.

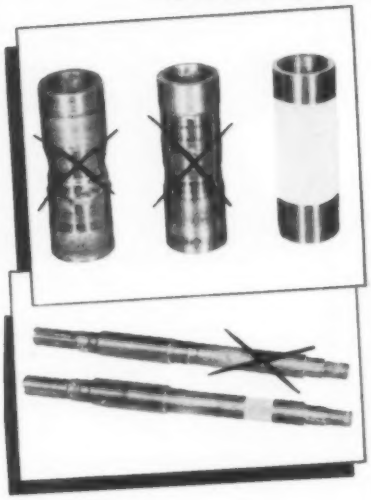


INSTALLATION of this gigantic newsprint machine for Bowaters Southern Paper Corporation in Calhoun, Tenn., was completed for scheduled start-up on Jan. 14, 1957. The machine, wider and faster than two original units at the Calhoun plant which had set world speed records, was designed to produce newsprint at speeds up to 2500 feet per minute.

THE WHOLE PACKAGE—from initial design through construction and mechanical erection—was delivered in this aircraft components plant built by the McGraw company for Fenn Manufacturing Company in Newington, Conn.

For more facts circle 517 on Reply Card

Eliminate
"CHEWED UP"
SHAFTS
with CHEMPRO
NEW SPRAYED
CERAMIC
SERVICE



Chempro's new extremely hard, chemically inert ceramic coatings applied to shafts and shaft sleeves eliminate the costly failure of "chewed up" or "scored" shafts and sleeves. Sprayed ceramic surfaces are highly resistant to abrasion, erosion and fretting corrosion under even the most difficult slurry service. They also give ideal protection against shaft wear under high packing gland pressures.

Pump down-time due to shaft or sleeve failure has been drastically reduced in every installation in which Chempro's sprayed ceramic surfacing has been used.

Write for new Chempro Bulletin CP28 for ordering information.

CHEMICAL & POWER PRODUCTS, Inc.
7 Broadway, New York 4, N. Y.

For more facts circle 518 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Wants Facts on Corrosion

PLANT ENGINEERING:

"In the January, 1957 issue of PLANT ENGINEERING there appeared an interesting and informative article, titled 'Designing for Corrosion Resistance,' by John L. McPherson.

"If reprints of this and succeeding articles in this series are still available, I will appreciate receiving a copy of each. We are greatly interested in the information in this article. There are many other articles in the magazine which we find of considerable value." *Ralph E. Meints, Chemical Process Engineer, Vern E. Alden Company, Chicago 2, Illinois.*

► Tear sheets of this article along with Part II "How Good Design Controls Corrosion," which appeared in the February issue, have been sent to Mr. Meints.—*Editors.*

Industrial Ventilation Again

PLANT ENGINEERING:

"In your February, 1957 issue, appeared an article covering the subject of foundry ventilation written by Mr. Kenneth Robinson, Ventilation Engineer for General Motors Corporation.

"Our copy of this issue has been misplaced and we would like to inquire whether reprints of the article covering the subject of foundry ventilation can be obtained and if not, would it be possible for us to purchase a February, 1957 issue from you?

"Any assistance you can give us in obtaining this article most certainly will be appreciated." *N. Amrhein, President, Federal Malleable Co., Milwaukee, Wis.*

► No need for readers to purchase copies of PLANT ENGINEERING in order to get extra copies of "Industrial Ventilation." Just drop us a line and we will send you a reprint of this eight-page article.—*Editors.*

Still-Pond Cooling Water

PLANT ENGINEERING:

"We are interested in the possibility of using a lake on our property as a cooling pond for test engine and eddy current dynamometer cooling water in our new engineering building now under construction.

"Would you have any references in your files of similar usage of bodies of water as still-pond usage, not as spray ponds? We would like to contact anyone who has operated such a system." *E. C. Rieger, Plant Engineer, International Harvester Co., Farm Tractor Div., La Grange, Ill.*

► No doubt there are readers who have put this idea into practice and we hope that they will pass along any information they have to Mr. Rieger. Meantime, we have sent him a number of articles from PLANT ENGINEERING and the names of possible sources of information.—*Editors.*

Infrared Heaters

PLANT ENGINEERING:

"We noticed an article regarding gas-generated infrared heaters in the December, 1957, issue.

"We are anxious to receive a brochure with prices and fuel consumption information on these heaters, but are unable to locate an address for Perfection Industries, the manufacturers of this item. We would appreciate your referring this letter to them, or sending us their address so that we may contact them directly." *George T. Beemer, Richards and Associates, Fort Myers, Fla.*

► This request has been passed along to D. W. Milestone, Perfection Industries, Div. of Hupp Corp., 1135 Ivanhoe Rd., Cleveland 10, Ohio, who will be glad to foward additional information.—*Editors.*

Safety Check Tear Sheets

PLANT ENGINEERING:

"We would like to have a reprint of the article, 'Safety Checks for Portable Grinders,' which appeared in the November, 1957, issue of PLANT ENGINEERING." *Mrs. Matilda B. Fralick, Sales Promotion Dept., Schramm, Inc., West Chester, Pa.*

PLANT ENGINEERING:

"We would like to secure 25 reprints of your article on 'Safety Checks for Portable Grinders' which appeared in your November, 1957, issue." *J. F. Corkery, Vice President, Thor Power Tool Co., Aurora, Ill.*

PLANT ENGINEERING:

"We have been informed that reprints are available of an article which appeared in the November, 1957, issue of PLANT ENGINEERING. The specific

NEW...from APPLETON

24" High-Bay Mercury Vapor Lighting Units

higher production . . . fewer rejects . . . improved employee relations . . . extended safety records

more effective illumination at the work level!

Here is a precision-designed lighting unit for large industrial interiors and high-bay plant areas. High illumination levels without uncomfortable glare... Ventilated hood for lower operating temperature and minimum dirt accumulation... the new APPLETON 24" High-Bay Mercury Vapor Lighting Unit is a unique combination of technical features which give you more useable illumination at the work level. Available in: 1 pc. socket type construction or with the 2 pc. APPLETON DISKONECT time-saving maintenance feature. (Permits both lamp and reflector to be removed as a complete unit without disturbing wiring!) Reflecting surfaces are of ALZAK* processed aluminum. Available for concentrating or spread-type illumination distribution. For use with 1,000 Watt Mercury Vapor Lamps, this new APPLETON 24" High-Bay Mercury Vapor Lighting Unit is designed to meet your specific needs. As with all APPLETON Industrial Lighting Products... you can *see* the difference!

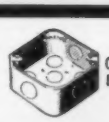
*A proprietory term of Aluminum Company of America

Sold Through Franchised Wholesalers Only

APPLETON ELECTRIC COMPANY
1701 Wellington Avenue, Chicago 13

Also Manufacturers of:

"ST" Series Connectors


Outlet Boxes

Malleable Iron Unilet Fittings

Reelites

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Note imbedded Nylon plug – locks screw automatically
SEXAUER EASY-TITE
Note Fiberglas backing – resists closing squeeze

NEW WAY TO

Prevent Faucet Leaks!

★ **9 out of 10 washers are fastened with screws that are TOO LONG or SHORT. The screws quickly loosen; the loosened washers are destroyed thru grind and squeeze of opening and closing faucets.**

34 years of research uncovers new solution

★ **Now, NEW (Patented) 'Sexauer' SELF-LOCK Monel screws, with an imbedded expanding NYLON PLUG, lock at the required depth AUTOMATICALLY, hold washers FIRMLY! Made of rustproof, noncorroding Monel, heads don't twist off, screw slots don't distort. They are easily removed when necessary, can be re-used repeatedly.**

★ **Used with NEW 'Sexauer' EASY-TITE faucet washers, they make a combination that outlasts past faucet repairs "6-to-1"! EASY-TITES are made of super-tough, pliable du Pont compound (neither rubber nor fibre) and reinforced, like a tire, with a vulcanized layer of Fiberglas. They resist distortion and splitting from shut-off grind and squeeze.**

Hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS, LABOR and costly FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY!

J. A. Sexauer Mfg. Co., Inc., Dept. S-38
2503-05 Third Ave., New York 51, N. Y.
Gentlemen: *Please send me a copy of your NEW, 126 page catalog "H."*

My Name _____ Title _____
Company or Institution _____
City _____
Zone _____ State _____

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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BACKTALK— FORETHOUGHTS

article we are interested in was entitled, 'Safety Checks for Portable Grinders,' and we would sincerely appreciate receiving four reprints of this article." *J. R. Humphrey, Gardner-Denver Co., Quincy, Ill.*

► As long as our supply lasts, we are glad to send readers tearsheets of articles published in PLANT ENGINEERING.—*Editors.*

Fluid Power Series Reprinted

PLANT ENGINEERING:

"Would you please send me a copy of articles 2 and 3 in the Fluid Power Maintenance series. These two articles appeared in the August and October, 1956, issues of PLANT ENGINEERING." *Larry Olson, Engineer, Modern Drop Forge, Blue Island, Ill.*

► Our supply of tear sheets of this series of articles is about exhausted, especially of the earlier articles. Because there has been a considerable demand for them, we have had the entire series reprinted in booklet form which is available for $1.00. Booklet contains 12 articles dealing with installation and care of hydraulic and pneumatic systems.—*Editors.*

Machine Repairs

PLANT ENGINEERING:

"Your recent series of articles on casting repair methods has been most interesting. If reprints of the series are available three copies would be appreciated." *W. H. Roberts, Jr., Vice President—Operations, Glyco Products, Inc., Williamsport, Pa.*

► This series of articles dealt with inspection of machinery to find out if repairs are necessary and with various methods of repair that could be used. They appeared in our August, September and October issues.—*Editors.*

Using Color in Industry

PLANT ENGINEERING:

"Please forward a copy of the article 'Putting Color to Work' appearing in the December, 1957, issue of PLANT ENGINEERING.

"In his article, Mr. Wombacher indicates that a wealth of material is available. I have not had too much success in gathering any good technical literature on the subject of color, especially for industrial use, and would appreciate receiving names or titles of references that are available.

"Articles of this type are especially valuable to refinery engineers, many of whom are just getting started in industrial color work and I would like to see more of them in your fine magazine." *B. F. Dahlstrom, Senior Refinery Engineer, Consumers' Cooperative Refiners Ltd., Regina, Saskatchewan, Canada.*

► Two companies that have done a great deal of work on the use of color in industry are the Pittsburgh Plate Glass Co., Paint Div., Pittsburgh 22, Pa., and the E. I. du Pont Company of Canada, Ltd., 1135 Beaver Hall Hill, P. O. Box 660, Montreal 1, Quebec, Canada. We are sure they would be willing to assist readers who are interested in learning more about the use of color in industry.—*Editors.*

Machine Foundations

PLANT ENGINEERING:

"Would it be possible to obtain reprints of the article 'Design Data on Machine Foundations,' by F. John Eggert, which appeared on pages 111 to 114 of the November, 1957 issue of PLANT ENGINEERING. We would like to have these for our engineering staff as we feel they would be most useful." *J. M. Heaps, Resident Engineer, Crown Zellerbach Canada Ltd., Ocean Falls, B.C., Canada.*

► Tear sheets are still available, but the supply is limited.—*Editors.*

Ladder Safety Reprint

PLANT ENGINEERING:

"Please send me your bibliography on inspection and testing of wood and wood ladders and safe practices in the use of ladders.

"I note this reference to 'Ladder Bibliography' in Markwardt's article, 'Ladders and Ladder Safety,' reprinted from PLANT ENGINEERING 1956." *L. W. Crandall, Professor of Civil Engineering, College of Engineering, University of Wisconsin, Madison, Wis.*

► Readers may still request reprints of article and bibliography.—*Editors.*

Work Positioning Article

PLANT ENGINEERING:

"Please send to the writer five copies of the article contained in the December 1957 issue of PLANT ENGINEERING entitled 'Work Positioning Progress.' This particular article starts on page 144 and concludes on page 150. We found the article very interesting and wish to circulate copies among our factory personnel." *Edward E. Nicholas, Manager, Sales Engineering, The Colson Corp., Elyria, O.*

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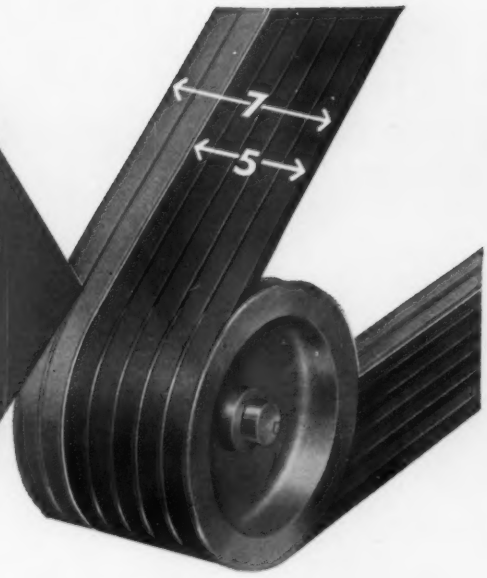


Cut sheave width and weight; save on drive costs by using Gates Super Vulco Ropes with 40% *more horsepower capacity.*

5 Gates Super Vulco Ropes do the work of 7 standard V-belts.

Sheaves with fewer grooves cost less . . . weigh less . . . occupy less space. Your drive design is improved.

A Super Vulco Rope Drive delivers more HP per dollar invested than any standard V-belt drive.

Helpful drive data is quickly available to you. Simply call your nearby Gates distributor for a Gates V-belt specialist. Stocks carried in industrial centers throughout the world.

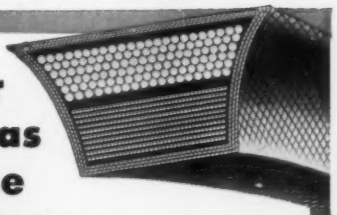
The Gates Rubber Company

Denver, Colorado

World's Largest Maker of V-Belts.

Gates Distributors are in the Yellow Pages

Gates The Mark of Specialized Research



No other V-Belt has ALL these advantages

1. **Flex-Weave Cover** (U.S. Pat. 2519590)
A Gates exclusive: provides greater flexibility with far less stress on fabric. Cover wears longer . . . increases belt life . . .more power available to driven machine.

2. **Concave Sidewalls** (U.S. Pat. 1813698)
Concave sides (Fig. 1) increase belt life. As belt bends, concave sidewalls become straight, making uniform contact with sheave groove (Fig. 1A). Uniform contact means less wear on sides of belt . . . far longer belt life.

3. **Tough, resilient tensile Cords**
Super-strong resilient tensile cords provide 40% greater horsepower capacity . . . easily absorb heavy shock loads . . . reduce number of belts required . . . save weight and space.

4. **High Electrical Conductivity**
Built into Gates Super Vulco Ropes for safer drives (in explosive atmospheres).

5. **Oil, Heat, Weather Resistant**
Special rubber compounds make Super Vulco Ropes highly resistant to heat, oil, and prolonged exposure to weather.

TPA 209

Gates Super VULCO ROPE Drives

40% more Horsepower Capacity

For more facts circle 521 on Reply Card

METAL-CLAD SWITCHGEAR

TORCHES IGNITE FLAMETRAP (bottom) and conventional insulation (top) simultaneously.

SECONDS LATER, FLAMETRAP has snuffed out, but conventional insulation still burns briskly.

New FLAMETRAP Insulation Snuffs Out Flame ...No Toxic Gases...Highest Arc Resistance

FLAMETRAP INTERPHASE BARRIER. Standard equipment on I-T-E 5 and 15 kv switchgear at no increase in price.

Take the heat away, and this new I-T-E developed **FLAMETRAP** insulation snuffs out . . . fast! This is today's most advanced flame-retardant insulation, and it is used exclusively in I-T-E Switchgear.

FLAMETRAP contains melamine resin—heretofore considered too expensive for commercial application. Unlike substitute ingredients, melamine gives off no toxic gases when it burns. So **FLAMETRAP** is far safer. And melamine stands up better under high temperatures. So **FLAMETRAP** suffers less from arc damage.

This latest improvement puts I-T-E switchgear even further ahead of the pack. It is one more of the quality details that keep coming your way from I-T-E without increase in price.

I-T-E service is as near as your telephone or mailbox. Why not call or write today. I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada, Eastern Power Devices Ltd., Port Credit, Ont.

I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA, PENNSYLVANIA

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How your truth dollars help keep the Reds in the red

• The truth dollars you give to Radio Free Europe help keep truth on the air behind the Iron Curtain.

And the truth is an enormously disruptive force to the Reds. For it keeps their captive people thinking . . . wondering . . . and less than completely dominated. The truth keeps needling the Reds. Breaks through their monopoly of lies. Keeps them unsure. Off balance. And thus the truth keeps up to forty fully armed Red divisions tied up policing Russia's satellite countries. Forty divisions, mind you, that might otherwise be put to more aggressive use elsewhere . . . and who knows where?

Your truth dollars keep the 29 super-powered transmitters of the Radi Europe network on the air . . . broad the truth behind the Iron Curtai every hour of every day.

Why *your* truth dollars?

Because Radio Free Europe is a p non-profit organization supported voluntary contributions of America ness and the American people. An dollars are urgently needed to kee the air . . . to help operate its transm pay for its equipment and supplies, scores of announcers and news ana 5 languages.

Help keep the Reds in the red your truth dollars to Crusade for Fr care of your local postmaster.

FREEDOM IS NOT FREE!

Your Dollars Are Needed To Keep Radio Free Europe On Th

SEND YOUR TRUTH DOLLARS TO

CRUSADE for FREEDOM

CARE OF YOUR LOCAL POSTMASTER

rs

the Radio Free
. . . broadcasting
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rope is a private,
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supplies, and its
news analysts in

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On The Air

OM

PUBLIC SERVICE ADVERTISING COUNCIL

B.F.Goodrich
FREE TW TIRE AND WHEEL Analysis Plan

can save you up to 50% on industrial tire costs

Without cost or obligation, your B.F.Goodrich Tire and Wheel Analysis Man will make recommendations that can save you as much as 50% on industrial tires—as much as 20% on maintenance costs alone. The TW Analysis Man will study your equipment, loads, hauling surfaces and other special problems you have. Then he'll recommend the right tires for you to use—recommendations that are unbiased because B.F.Goodrich makes a *complete* line of industrial tires. Hundreds of companies, large and small, have taken advantage of this FREE offer. You can too. Just mail the coupon. Do it now!

A special consulting service is available to manufacturers of materials handling equipment.

B.F.Goodrich Smileage

B. F. Goodrich Tire Company, A Division of The B. F. Goodrich Company
Department TW-682, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

Name_____

Company_____

Street_____

City_____ Zone____ State_____

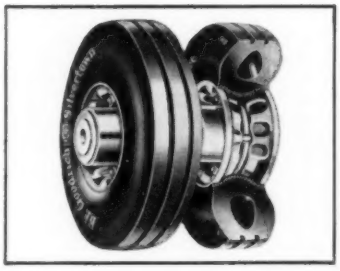
B.F.Goodrich sh

The right industrial tire saves you as much as 50% on tire costs. B.F.Goodrich makes the right tire for your job — no matter how specialized it is. These pages contain the basic facts about B.F.Goodrich industrial tires. Read them now and learn how you can save money on industrial tires—then keep these pages for future reference.

A TIRE TYPES for EVERY purpose

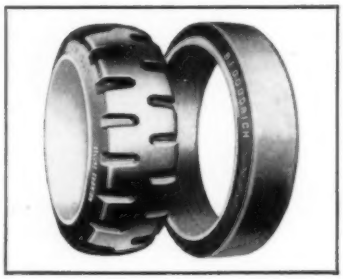
Pneumatic

For all types of materials handling equipment where cushioning, speed, economy and quiet operation are important. For both high and low speed use.



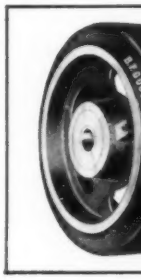
Pressed-On Solid

For industrial power trucks, tractors and trailers. Available in regular or Deluxe Cushion types for extra load protection and maneuverability.



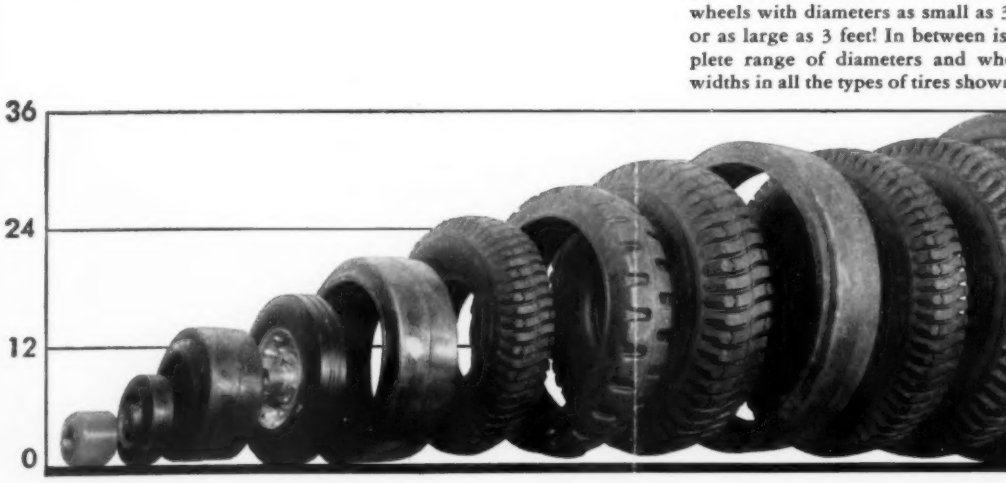
Vulcanized-On Solid

For hand trucks, trailers, push carts, wagons and all other free-rolling equipment. Your choice of compounds to fit the tread to the job.



B TIRE SIZES for EVERY wheel – 3 inches to 3 fee

B.F.Goodrich makes industrial t
wheels with diameters as small as 3
or as large as 3 feet! In between is
plete range of diameters and wh
widths in all the types of tires show



shows you how to cut

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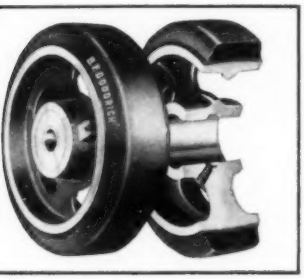
Caution: because there are so many variables in tire type, size, tread compound and tread design, it takes a tire expert to pick the *one right tire* for a materials handling job. Never order industrial tires without first discussing your problem with a tire expert such as the B.F.Goodrich Tire and Wheel Analysis Man.

Zero Pressure

Designed for trailers, dollies, hand trucks, wheelbarrows, farm implements and all carriers of medium and light loads. Made with solid or hollow centers, depending on load requirements.



3 feet!

ndustrial tires for
as small as 3 inches
between is a com-
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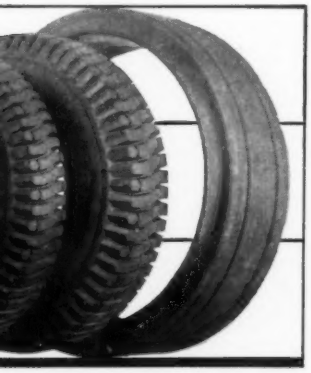
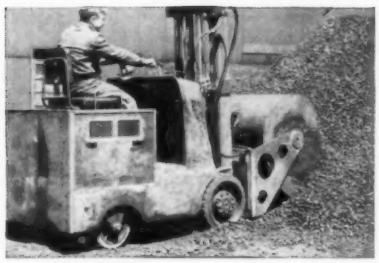
f tires shown above.



C TREAD COMPOUNDS for EVERY operating surface

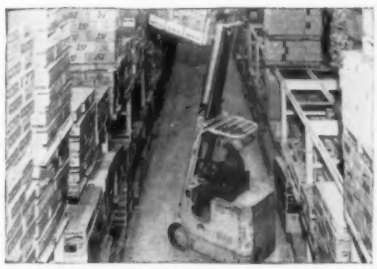


Universal Compound

Available in Pressed-On tires. Choose the Universal if cutting, chipping and excess wear are problems.

EZ Compound

The EZ compound is available in Pressed-On Deluxe Cushion tires. Specifically designed for electric trucks to assure low power consumption.



Oil-Proof

In both Pressed-On and Vulcanized-On tires. It resists oil and other petroleum products that are notorious "rubber killers."

Carrier Compound

Choose it when you need easy rolling and superior wear on free-rolling wheels. Available in Vulcanized-On tires only.

industrial tire costs

D TREAD DESIGNS . . . for EVERY job

PNEUMATIC

Choose the All-Purpose if you need traction both indoors and outdoors and want the advantages of greater protection for hauling surfaces.

Moving heavy loads in factory yards goes faster, more efficiently on Universal tires. They provide maximum load-carrying capacity.

Equip trailers that move fragile loads with the Ribbed Pneumatic. It cushions the load to prevent breakage, ends noise that causes worker fatigue.

VULCANIZED-ON

Free-rolling equipment starts, moves and stops easier on Vulcanized-On tires. Tires absorb shock, save breakage, reduce maintenance costs.

SOLID

Use the Tracti
of trucks and t
power in forw
lift stability.

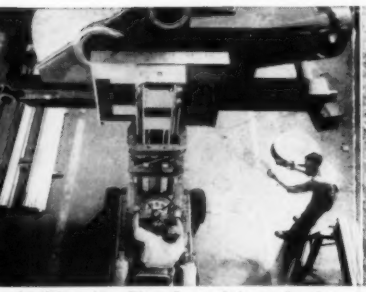
The Deluxe C
ideal for steerin
and tractors. It
driver better co

Choose the Flat
such equipmen
where extra-he
tread and easy

The Flat Base S
for use in warel
ing dock or p
gives extra-lon

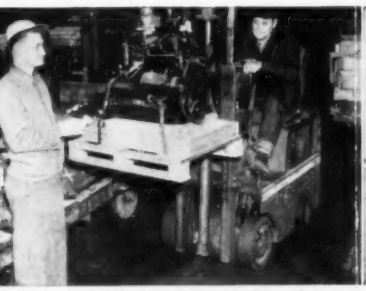
B.F.Goodrich treads are designed specifically for the job. Pneumatic treads include ribbed and the popular all-purpose traction. Solid tires are available in smooth, nondirectional traction, grooved or safety treads.

Below are commonly used types of B.F.Goodrich industrial tires. The photographs illustrate how each tire answers specific materials handling problems.



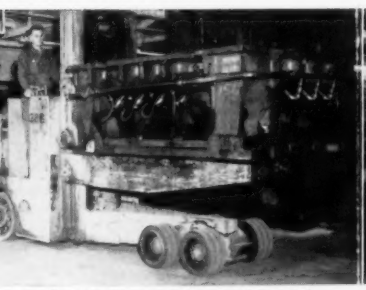
e the Traction Tread on drive wheels rucks and tractors. Gives full pulling ver in forward or reverse, greater stability.

Where cutting and chipping are problems, choose the Deluxe Cushion Traction tire in Universal compound. Also available in Oil-Proof compound.

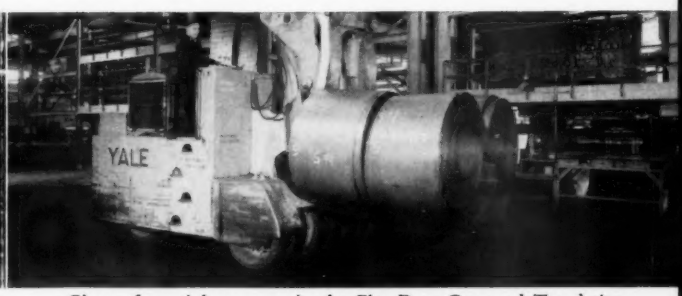


e Deluxe Cushion Smooth Tread is al for steering wheels on power trucks l tractors. It turns easily, safely, gives ver better control of vehicle.

Extra-thick Deluxe Cushion Smooth Tread takes more wear and tear, absorbs jolts and shocks ordinarily transmitted to driver and load. Ideal for docks, steel mills, and loading platforms.



oose the Flat Base Grooved Tread for h equipment as fork or ram trucks ere extra-heavy loads require a wide d and easy steering.



Circumferential grooves in the Flat Base Grooved Tread tire are designed for improved steering and long wear. Use on heavy tractors and trailers.

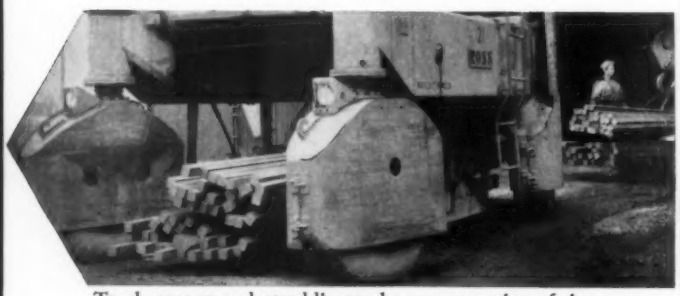
e Flat Base Smooth Tread tire is ideal use in warehouse or factory, on load- dock or platform. Smooth tread es extra-long service.

If you operate power trucks or trailers in general service, choose the Flat Base Smooth Tread for either drive or free-rolling wheels. Designed for high lift stability.

B.F.Goodrich

makes a complete line of industrial tires for every materials handling job. That's why it will pay you to *specify B. F. Goodrich tires when ordering new equipment.*

All-Purpose tires are best for jobs where loads range from light, bulky items to big, heavy equipment. They have greater stability and capacity for heavy loads.



Truck cranes and straddle trucks are examples of the heavy duty equipment for which the Universal is designed. The tire gives full traction in forward or reverse.

Ribbed tires are available for high speed use on auto trailers, boat trailers, motor scooters, etc., and for low speed use on hand trucks, power mowers, wheelbarrows, etc.

If you operate hand trucks, trailers, push carts, wagons or similar types of free-rolling equipment, Vulcanized-On tires can save you money on upkeep and replacement.

Does
public
adver

Says Mr. (

"I have been s
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working for me

"For instance,
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Often I don't
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tising is really
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publications tha
by the men who

specialized oes business ublication dvertising pay?

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front... the men the ads are supposed to help... the men who sell.

Here are the statements of salesmen who know what advertising does for them when it appears in the industrial, trade or professional publications that serve the specialized markets to which they sell:

Glen Chase
Yarnall-Waring Company
sells to industry

ys Mr. Chase:

ave been selling *Yarway* products for over n years, and I'll have to admit that I've n the trade paper advertising for granted. when I stop to think I realize it's out there king for me all the time.

r instance, I never have to tell my prospects YARNALL-WARING is, or what they make. n I don't even have to tell them why they ld see me and find out what I've got to offer. advertising has done much of the *who, what, why* of selling before I make my contact.

re's an example: I recently had a phone from a potential customer that I'd never called on. He was having trouble with a petitive product. He'd seen our ads and ted to try my product. That's one time when sale consisted merely of writing the order. ertising really made the sale.

e advertising has given people a good ression of our company, too. This is sur- ing, when you stop to think about it, because re a relatively small organization.

r company name is YARNALL-WARING but eat many people say '*Yarway*'. I believe this of our trade-mark may be due to the wide of the company trade-mark in our trade er advertisements, on our product name es, shipping cartons and stationery."

k your own salesmen what your com- 's business publication advertising does for . If their answers are generally favorable, you e sure that your business publication adver- g is really helping them sell. If too many vers are negative, it could well pay you to review advertising objectives—and to make sure the ications that carry your advertising are read he men who must be sold.

How salesmen use their companies' advertising to get more business

Here's a useful package of ideas for the sales manager, advertising manager or agency man who would like to get more horsepower out of his advertising. Send for a free copy of the pocket size booklet which reports the successful methods employed by eleven salesmen who tell how they get more value out of their companies' business publication advertising.

You can be sure that more of your salesmen will use your advertising after they read how others get business through these simple methods. The coupon is for your convenience in sending for your free copy.

NATIONAL BUSINESS PUBLICATIONS, INC.
Department 7E
1413 K Street, N. W.
Washington 5, D. C. **STerling 3-7533**

Please send me a free copy of the NBP booklet "How Salesmen Use Business Publication Advertising in Their Selling."

Name _____

Title _____

Company _____

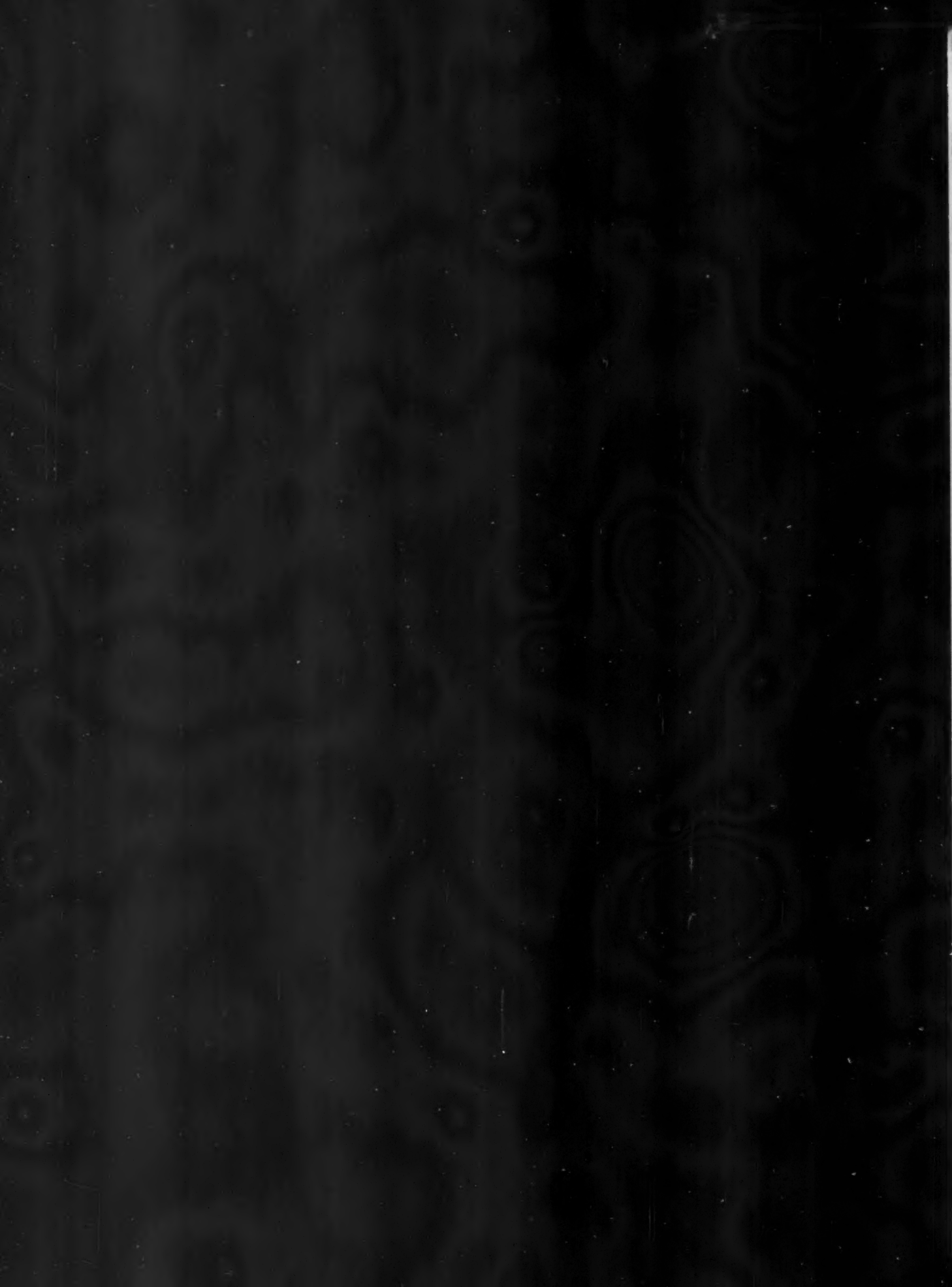
Street Address _____

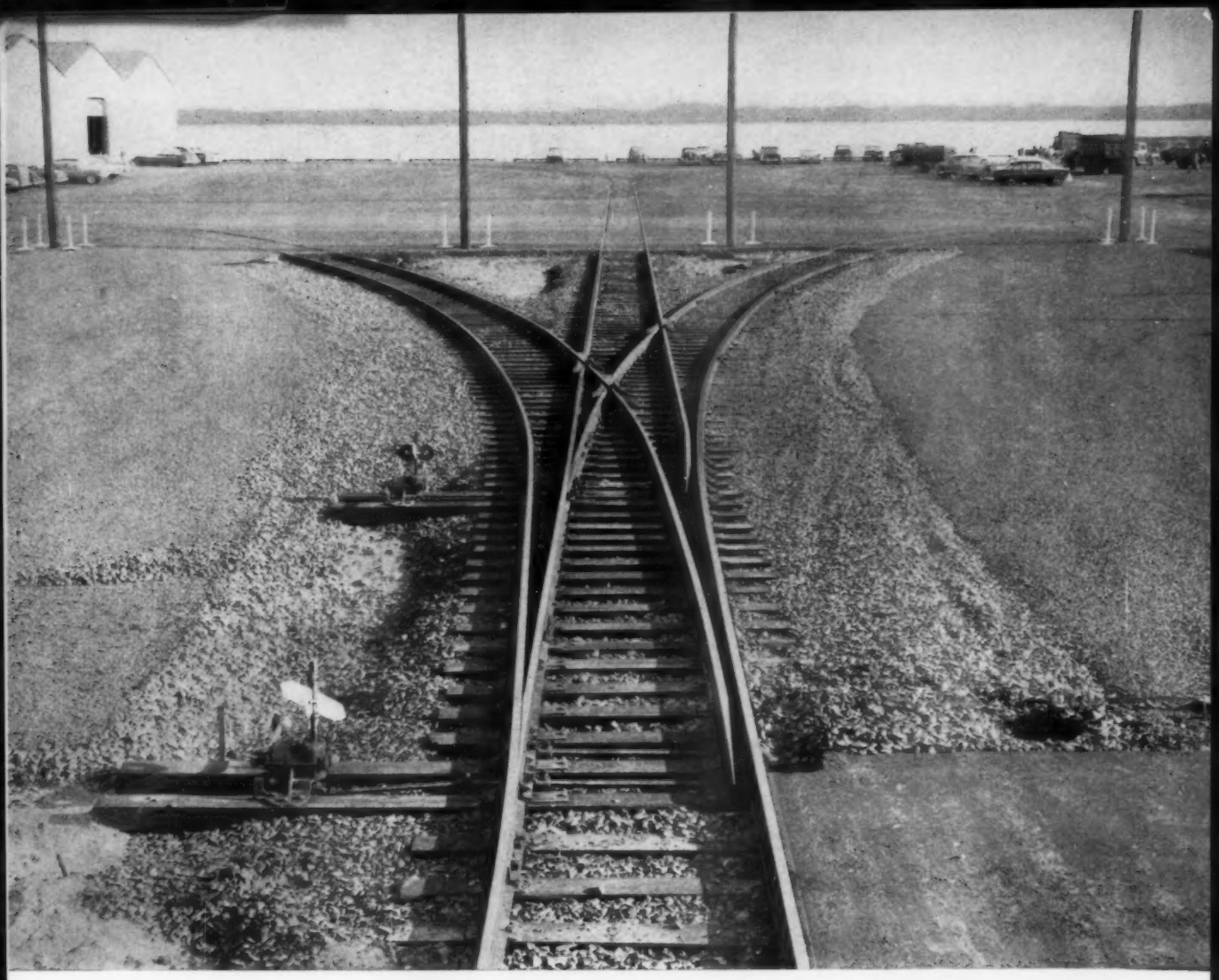
City _____ Zone _____ State _____

National Business Publications, Inc.

NBP

...each of which serves a specialized market in a specific industry, trade or profession.





Contractor: Stock Construction Corporation, N. Y.

USS Trackwork at Port Newark pre-curved, pre-drilled and pre-cut to reduce installation costs

21 turnouts, 1 crossing, approximately 80 feet of curved rail, and 280 feet of straight rail were all pre-cut, pre-drilled, pre-curved (where required) and "match marked" for a fast, easy, economical trackwork installation at the Norton, Lilly & Company's steamship terminal in the Port of New York Authority's Port Newark. Complete pre-fabrication at the plant saved many thousands of dollars in labor costs at the site.

Perhaps complete shop pre-fabrication is the answer to your turnout installation costs. Why not discuss this matter with one of our engineers? He will gladly point out its advantages, and also tell you about the dozens of "little things" that make USS Industrial Trackwork the finest you can buy.

For a copy of our catalog, "USS Industrial Turnouts," write to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania. We will send it to you without charge.

United States Steel Corporation, Pittsburgh
Columbia-Geneva Steel, San Francisco
Tennessee Coal & Iron, Fairfield, Ala.
United States Steel Export Company, Distributors Abroad

USS United States Steel

For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Polyethylene Replaces Wood

INSTALLATION OF A system of high strength polyethylene-lined drain tanks has reduced maintenance costs and repair downtime in the etching room of Arrow Engraving Co., Cleveland, Ohio.

Two wooden drainage sinks are maintained in the etching rooms. One handles iron chloride wastes from the finish, or flat etching, baths; the other handles wastes from the nitric acid and iron chloride deep etching machines. Each sink is lined with polyethylene ¼-in. thick.

The two sinks are in separate rooms, but are connected by tubing, so that all nitric and iron chloride wastes, diluted with water, are flushed to sewer outlets through the same pipe.

Formerly wooden sinks lined with tar had been used to contain the acid wastes. Steel sink fittings, also coated with tar, were used with heavy crockery tubing connecting two sinks.

Deep-etch tank lined with polyethylene shows no ill effects from nitric acid waste after being used for nine months

Acids and the carbon tetrachloride solvents used, attacked the tar, causing frequent leaks in the sinks themselves. Considerable time was spent in relining the sinks with tar. *From Plastics Weldor and Fabricator, published by American Agile Corp., Maple Heights, Ohio.*

Protective Shelters in Europe

IN 1957, the Republic of West Germany was preparing to enact a Civil Defense law towards the provision of protective shelters for the

(Continued on page 44)

Chemicals Replace Manual Labor To Clean Paper Machine; Cut Time 90 Per Cent

A CHEMICAL CIRCULATION cleaning method which takes less than an hour to clean a cylinder paper making machine, has replaced the old manual method of cleaning that took 16 man-hours, at the Daring Paper Company, in Bridgeport, Pa.

The complete paper making system consists of cylinder, couch and press rolls and all the incidental pressure rolls. The build-up of soil on this equipment includes asphalt, tar, hard-water scale and resins.

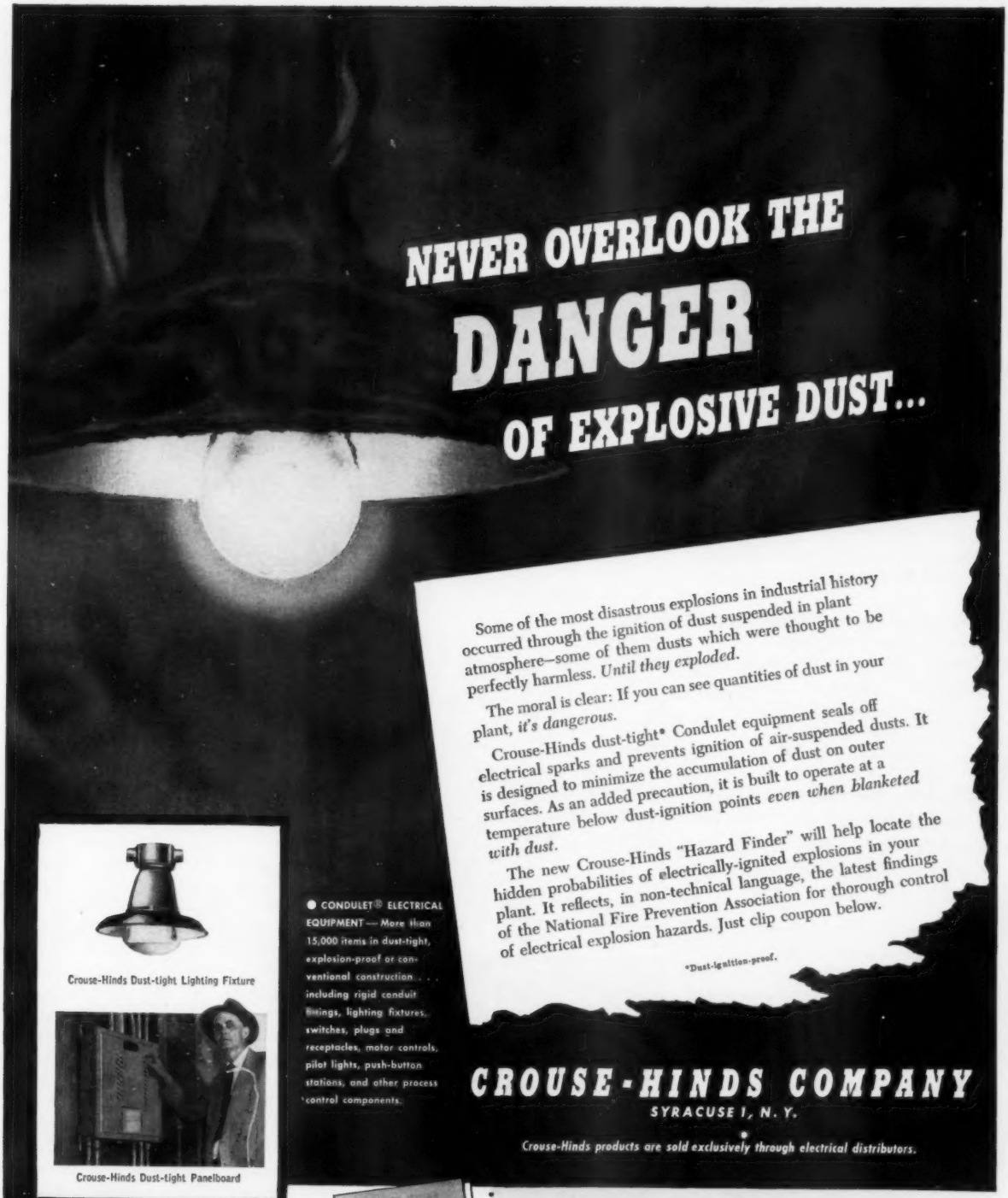
The former procedure was to shut down the machines, raise all pressure and couch rolls, slack off the felt so that it could be pushed to one side and then manually wire-brush the deposits from all areas.

Now, a special detergent is mixed in the liner-water tank, heated to 160F with a steam line and circulated through the system pump to the showers on each cylinder roll. Since the machine is running, the cylinder rolls transfer the solution to the bottom felt, which in turn, carries it to the couch rolls, the top felt and the press rolls.

A long trough is placed under the overflow pipes from the cylinder roll vats to catch the solution for return to the liner-water tank and recirculation. After being circulated for about 30 min, the detergent solution is pumped to a drain through the extractor roll.

By using the chemical cleaning method, "wraparounds" or the sticking of paper stock to the cylinders, have been eliminated. Trouble of this kind was formerly attributed to the rough surface left on rolls by incomplete removal of soils, and by scratches caused by wire brushing. *From Oakite News Service, published by Oakite Products Inc., New York, N. Y.*

Solution starts work at cylinder roll showers, left; removes soil from rolls, center; is caught in trough, recirculated, right



NEVER OVERLOOK THE DANGER OF EXPLOSIVE DUST...

Some of the most disastrous explosions in industrial history occurred through the ignition of dust suspended in plant atmosphere—some of them dusts which were thought to be perfectly harmless. *Until they exploded.*

The moral is clear: If you can see quantities of dust in your plant, *it's dangerous.*

Crouse-Hinds dust-tight* Condulet equipment seals off electrical sparks and prevents ignition of air-suspended dusts. It is designed to minimize the accumulation of dust on outer surfaces. As an added precaution, it is built to operate at a temperature below dust-ignition points *even when blanketed with dust.*

The new Crouse-Hinds "Hazard Finder" will help locate the hidden probabilities of electrically-ignited explosions in your plant. It reflects, in non-technical language, the latest findings of the National Fire Prevention Association for thorough control of electrical explosion hazards. Just clip coupon below.

*Dust-ignition-proof.

Crouse-Hinds Dust-tight Lighting Fixture

Crouse-Hinds Dust-tight Panelboard

● CONDULET® ELECTRICAL EQUIPMENT — More than 15,000 items in dust-tight, explosion-proof or conventional construction . . . including rigid conduit fittings, lighting fixtures, switches, plugs and receptacles, motor controls, pilot lights, push-button stations, and other process control components.

CROUSE-HINDS COMPANY

SYRACUSE 1, N. Y.

Crouse-Hinds products are sold exclusively through electrical distributors.

Send coupon today for handy new HAZARD FINDER!

Contains 13 check questions to which every management team should know the answers! Each answer evaluated in accordance with National Electrical Code requirements.

CROUSE-HINDS COMPANY
1205 Wolf St., Syracuse 1, N. Y.

Send me your Hazard Finder.

Name_____

Position_____

Company_____

City_____

Zone_____ State_____

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

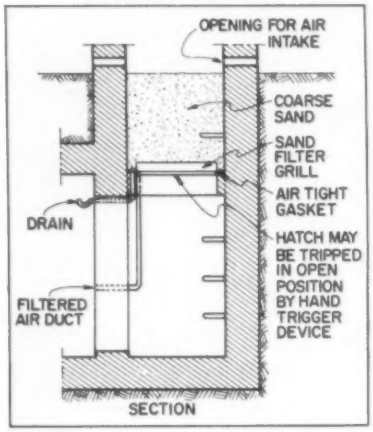


Diagram of sand filter and emergency exit used in German air raid shelter

entire West German population in the event of nuclear attack.

Three types of shelters have been established as standard:

1. Type A—resistant to 125 psi peak overpressure.
2. Type B—45 psi, and
3. Type C—15 psi

The design for steel reinforcement of concrete structures is 50,000 psi. The structures are under-reinforced, that is the steel percentage is less than that required for a balanced design.

One structure located in the subbasement of a large bank building in Dusseldorf, has walls, floor and ceiling each with an effective thickness of concrete of approximately three and one-half feet. Intermediate grade steel was used as reinforcement. The percentage of steel exceeded one per cent. This shelter has housing for four 50-man groups and includes a first aid room, a gas resistant chamber, the use of gas and blast doors, and ventilation by natural, by electric-driven mechanical and by hand-driven mechanical means.

A modified shelter door hinge that can withstand high blast pressure and absorb high energies was used. The door itself is formed in the shape of a dish, with the convex face outward. This allows the face of the door to depress and yield before the edges of the door go beyond the elastic range.

Another feature of the shelters is a sand filter used for air purification and also as an emergency escape hatch.

Many details of design are provided in handbooks and other technical publications. The data is not based on rigorous dynamic analysis alone, but rather on experience gained during the last war and from model testing. *From Civil Engineer Corps Bulletin, published by Bureau of Yards and Docks, Department of the Navy, Washington, D. C.*

Protecting Precision Parts

PRODUCERS OF PRECISION parts have, at times, encountered problems of how to guard against damage to close tolerance and critical surface areas. Such was a problem, until recently, at the plant of Walter Kidde & Company, Inc., Belleville, N. J.

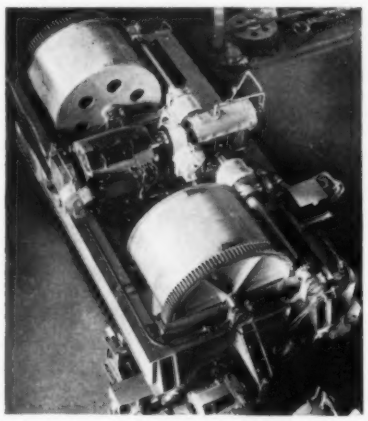
In the construction of fire extinguishers, precision-produced valves are machined to extremely close tolerances and have critical surfaces. To avoid scratching, or otherwise contaminating critical areas of the valves, they are placed in specially designed compartmented boxes for storage prior to assembly into the extinguishers. These shearing edge boxes, costing approximately 30 cents each, are used and re-used many times over and have a life expectancy of about a year before replacement is necessary.

During assembly of the valve components, the parts are removed from their containers. The empties are then deposited into metal baskets for safe, temporary storage before being refilled or returned to stock. *From a release of Wheeling Corrugating Co., Wheeling, W. Va.*

Boxes which will be re-used to carry precision parts are emptied into basket

Ladle Crane Capacity Booster

INCREASING THE CAPACITY of a steel mill ladle crane 23 per cent without adding to its original weight required careful planning by the Morgan Engineering Co., Alliance, Ohio. This restriction was specified since adding any weight to the crane would directly reduce the additional capacity obtained. The crane was built in 1917 with a rated capacity of 150 tons, and although it was still giving excellent service, the steel mill recently gave Morgan the task of boosting its capacity to 185 tons.

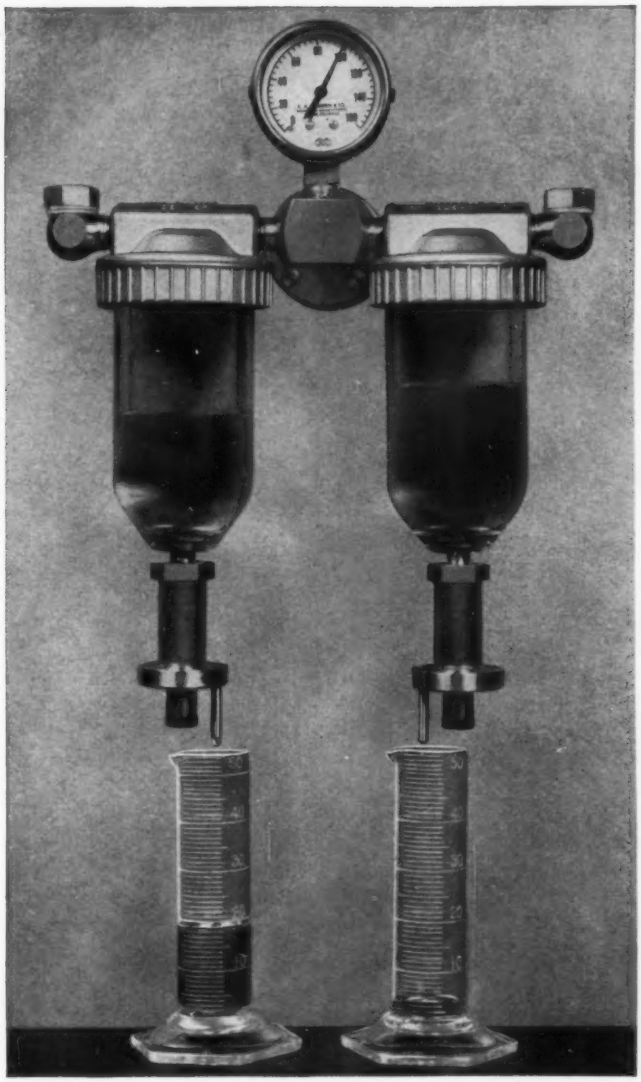


Double enveloping worm gearsets helped boost rated crane capacity 23 per cent

One of the major factors in the solution of this higher-capacity, weight-control problem was the selection of double-enveloping worm gearsets for the hoist and trolley drives. On a load-carrying capacity basis, these gearsets are smaller—and thus considerably lighter—than other worm gearsets having the same rating. Unit loads are spread over a larger area of each tooth and load-carrying capacity is increased.

Basic drive for the hoist is an 18-in. center distance, 15:1 reduction, double-enveloping worm gearset. Input is supplied by a 135 hp motor operating at 410 rpm.

The drives for the trolley consist of two double-enveloping worm gearsets with 10-in. center distances, 23:1 reduction ratios, powered by



ANTILEAK DEMONSTRATION

Suntac oil in one chamber, your present hydraulic oil of the same viscosity in the other. Both oils are forced out through sintered bronze bearings. In this photograph, pressure of 100 psi caused a straight mineral oil to leak out four times faster than Suntac.

SUNTAC CUTS HYDRAULIC OIL LOSS AS MUCH AS 75%

See this demonstration in your plant

Take about five minutes at your own desk to learn how Suntac® oils stay put in hydraulic systems . . . reduce oil loss through loose joints and worn fittings.

Match Suntac against the hydraulic oil you're now using—see how the exceptional non-gummy antileak characteristics of Suntac can reduce your oil losses as much as 75%. *Some users have even reported savings of 90%.*

Call Your Sun Representative

Have him arrange with a Sun Lubrication Engineer to give you and your staff a private demonstration. For further information on the uses of Suntac in hydraulic systems and in general lubrication, write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. Py-3.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

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IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

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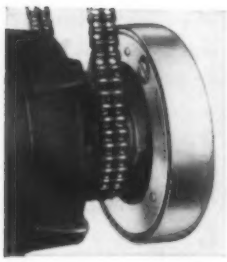
OFF-THE-SHELF

SERVICE WHEN YOU NEED IT...



Heard About Whitney-Tormag Magnetic Drives? *For complete motor overload protection, cushioned starts and high efficiency, ask about our new permanent magnet, self-contained power tranfer unit. Available in 1 and 2 H.P. units as stock items, additional sizes up to 15 H.P. will follow. Write for literature.*

Whitney, the *complete* line of finished steel chain, attachments and sprockets meets every industrial demand. Packaged for convenience, sure stock identification, easy, clean handling . . . exclusive plastic packaging of disassembled parts permits ready selection, quick, easy chain assembly.

Depend on your nearby Whitney distributor for all drive replacements and technical assistance. Your profitable production is Whitney's foremost project!

Whitney
CHAIN COMPANY
306A HAMILTON ST., HARTFORD 2, CONN.

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY-TORMAG DRIVE

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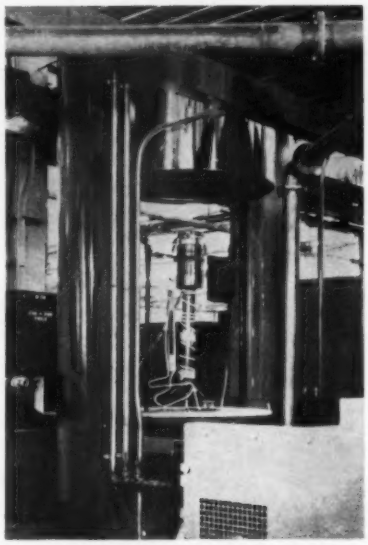
PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

33 hp motor frames operating at 250 rpm. Motors are wired in series. *From a release of Cone-Drive Gears, Div. of Michigan Tool Co., Detroit, Michigan.*

Coaxial Cable for Induction Heat



Coaxial cable supplies power for induction heat used to evacuate cathode-ray tubes at Hughes Aircraft Co. (From a release of Andrew Corp., Chicago, Ill.)

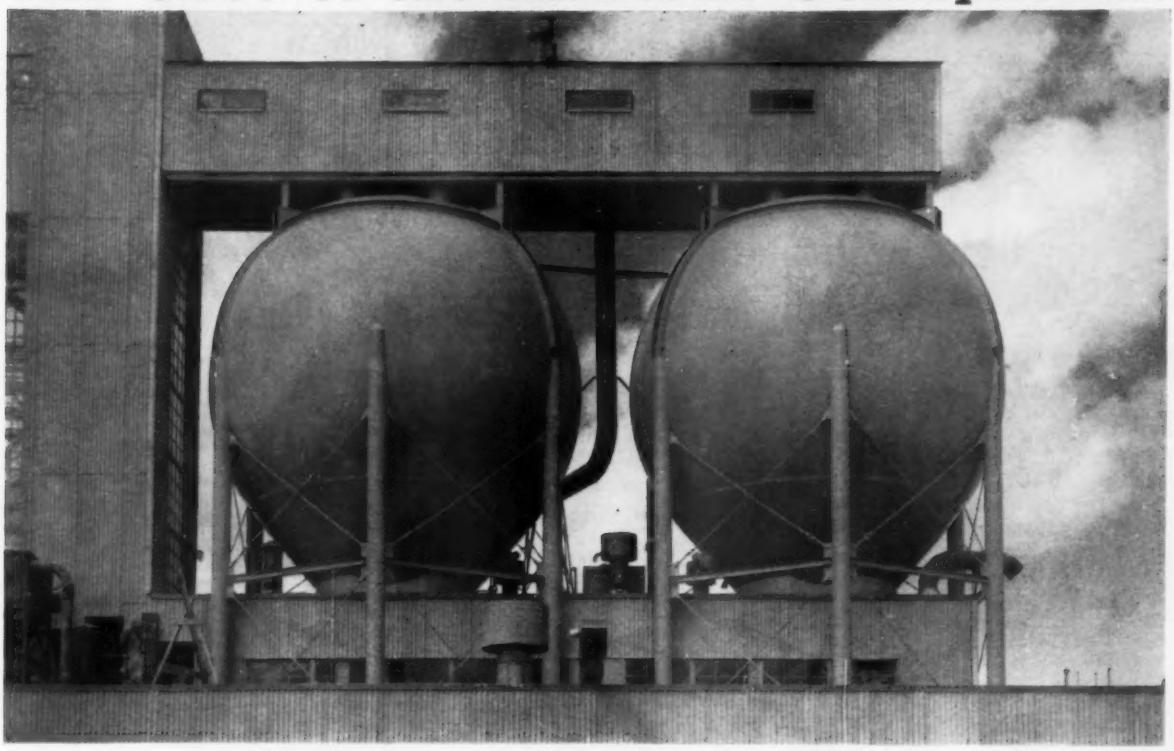
"Light Bulbs" That Bend

A FLEXIBLE "light bulb" which can be bent into various shapes as desired is actually an electroluminescent cell. Electroluminescence is a method by which specially coated sheets of glass, metal, or plastic can be made to produce light. A phosphor is coated on a panel which has been treated to conduct electricity so that when power is applied, the panel lights.

A method has been found to apply these phosphors to plastic, nylon, or steel mesh. It is expected that in the future it will be possible to produce window shades, drapes, and other flexible materials that actually produce light.

While it is believed that it will be several years before such flexible lamps are available commercially, already a number of uses can be seen for such lamps. Applications

The Case of the Airborne Conispheres:



Why Linde wanted them . . . How CB&I designed and built them

In order to keep a ready and free-flowing supply of calcium carbide available for generation into acetylene, the Linde Company specified that these two 500-ton capacity Conispheres* be installed on the roof of their Montague, Michigan, plant. In order to overcome a specific set of problems it was necessary for CB&I to incorporate special features into their design and construction. Here's how it was done:

Problem: *Insure safe, continuous operation.*

Solution: (1) Structures were designed to meet a specified emergency condition at an increased stress level, as well as to meet normal service conditions at normal stress levels in all parts not governed by explosion conditions. (2) A series of six safety outlets vent tanks upward. (3) Heavy baffle plates were suspended inside the tanks to control flow of carbide.

Problem: *Tanks must support superimposed load of gallery and feed belt equipment.*

Solution: Special framing distributes load to supporting columns of the tanks.

Problem: *Tanks must be mounted on sloping roof.*

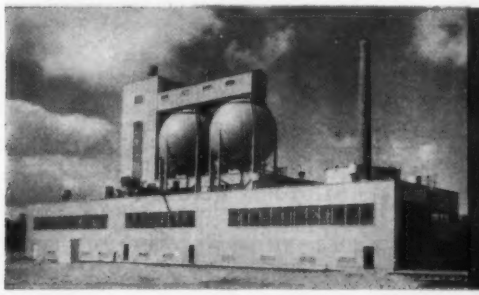
Solution: Three of the supporting columns are longer than others to compensate for roof plane.

Fully coordinated facilities for the design, fabrication and erection of standard or special steel plate structures permits CB&I to work to the most exacting requirements. . . . For this reason industry leaders call on CB&I for the tough jobs and rely on the quality of workmanship that goes into *any* CB&I built structure. A new booklet describes CB&I FIELD SERVICES . . . write our nearest office.

At Montague, Michigan, Linde is one of three major companies combining their talents and mass production facilities to produce DuPont *Neoprene*. Linde Company is a division of Union Carbide Corporation.

*A Conisphere is a Hortonsphere® designed with conical bottom outlet.

E55C



Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, GREENVILLE, PA. and NEW CASTLE, DEL.

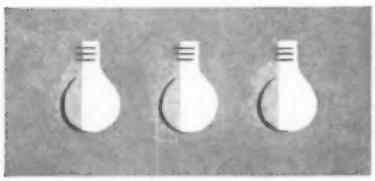
REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland

Hydro-Filter Highlights of:
DUST CONTROL DOINGS

Dust Control problem of light bulb manufacturer is brought to light

The Problem:

A leading manufacturer of light bulbs wanted to build a new manufacturing line but was plagued by problems they had experienced with an existing wet scrubber. *No wonder* . . . powdered glass, broken bulbs, colored ceramic frit, alcohol and resins are used in the process and the line must operate 24 hours a day—7 days a week. A shutdown on the dust collector would mean a shutdown for the entire operation because of dust and noxious fumes. As a result, only two scrubber manufacturers would bid on the job.



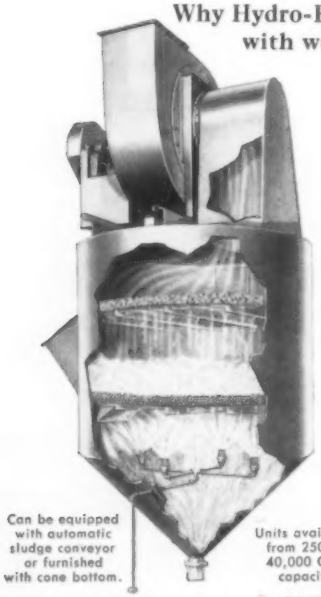
The Solution:

A type I Hydro-Filter with automatic sludge conveyor was selected for the job after customer evaluated evidence of its efficiency on the basis of (1) ability to operate at rated efficiency over prolonged periods at heavy dust load; (2) ability to operate over prolonged periods without shutdown for maintenance.

The Result:

Hydro-Filter did the job, and more. After 6 months operation the company ordered their *second* Hydro-Filter.

Why Hydro-Filter combines exceptional efficiency with welcome ease of maintenance:


Can be equipped with automatic sludge conveyor or furnished with cone bottom.
Units available from 250 to 40,000 CFM capacity

Air, water and glass spheres do the work in Hydro-Filter. There are no moving parts in the collection area. No baffles; nothing to load up and no "dead" areas to make cleaning a chore and efficiency a *myth*. The relatively simple design permits economical use of special materials of construction. It is designed to operate on dusts, sprays, fumes, and mists and can be equipped for recirculation of the liquid scrubbing medium.

Hydro-Filter will maintain a constant high level of efficiency over wide variations in volume of air and heavy dust loads. And because of its simple design, it will provide ease of maintenance *unmatched by any equipment* for similar use.

Write for descriptive bulletin today.

TIRED OF DUST COLLECTOR MAINTENANCE?
. . . YOU'RE READY FOR HYDRO-FILTER

National Dust Collector Corporation

604 Machinery Hall Building • Chicago 6, Illinois

For more facts circle 531 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

might include guides for directing military personnel through hazardous areas, digital displays in instruments, and also as a substitute for certain instrument panels now in use.

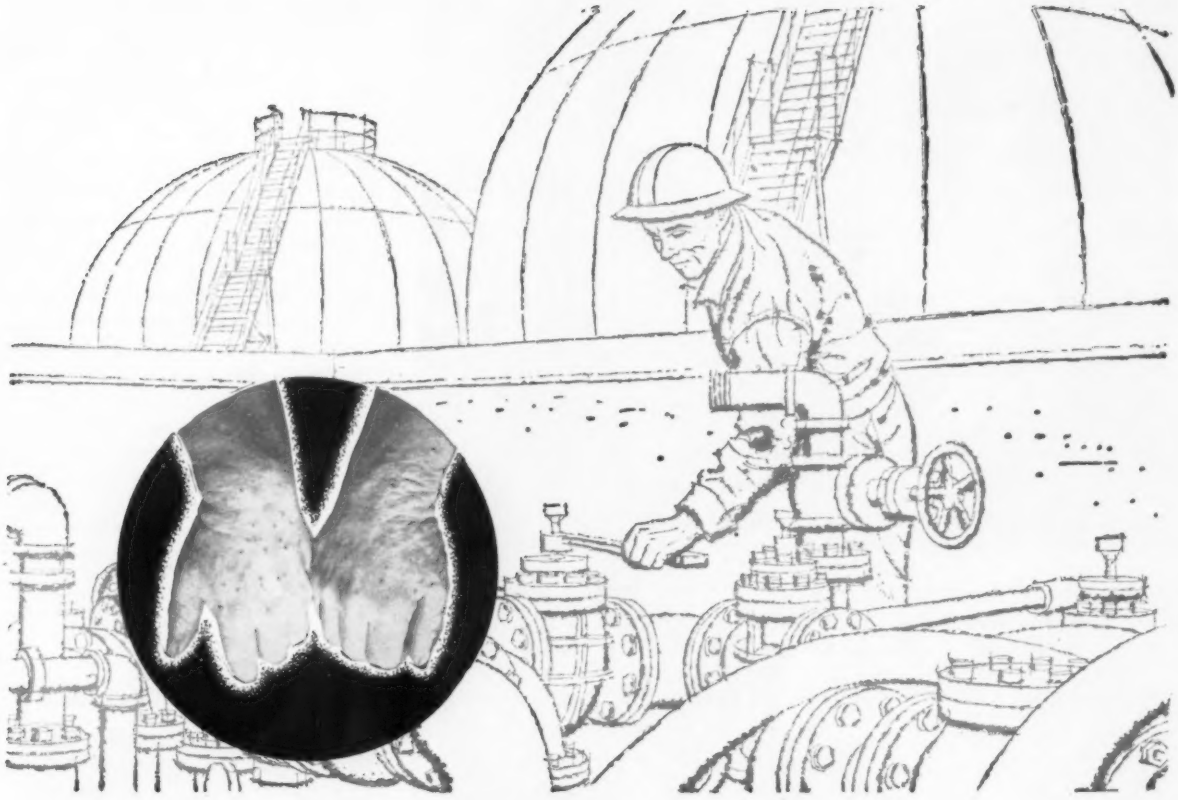
Experiments are also being made with transparent phosphors. This means that a phosphor can be sandwiched between two sheets of glass having an electrical conducting coating. During the day this glass would allow the daylight to come through and permit the viewer to look out (or in) in the customary manner. At night, however, electricity would be applied and the transparent phosphor would emit light. The use of these transparent electroluminescent windows would provide the effect of having daylight twenty-four hours a day. *From a release of Westinghouse Electric Corp., Lamp Div., Bloomfield, N. J.*

Paper Wipers— Jack of Cleaning Jobs

CLOTH WIPERS used for cleaning thermosetting cement off parts for high fidelity sound systems at the

Worker keeps hands, parts clean with paper wipers dipped in a ketone solvent

Camden plant of Radio Corporation of America, would leave lint and fuzz on the parts and on employees' hands, too. Because the cement could not be removed from the cloths by laundering, so that they could be



Why **DERMATITIS** is a needless penalty

Dermatitis caused by industrial materials such as chemicals, oils and abrasives can be prevented. Simply. Inexpensively. With a basic program that safeguards and improves the hygiene of workers — the West Program of Dermatitis Prevention and Control.

How does it work?

No contributing source of dermatitis is overlooked. Specially formulated handcleaners insure personal cleanliness. Antiseptic creams help protect exposed skin areas. "Vinylite" aprons and armguards prevent clothing contamination. Other specialties protect against bacteria infections.

Workers are protected against physical discomfort, lowered morale and lost time.

Management is protected against the costs of medical care, absenteeism, replacement training, sacrificed quality and lost production.

Why not discuss the West Program of Dermatitis Prevention and Control with one of our specialists? His recommendations will help you eliminate the needless penalty of dermatitis. No obligation of course. Just send the coupon.

Programs and Specialties for
Protective Sanitation and Preventive Maintenance

WEST CHEMICAL PRODUCTS INC.

WEST DISINFECTING DIVISION

WEST CHEMICAL PRODUCTS INC., 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal

☐ Please send your 24 page booklet "The Control of Dermatitis in Industry."
☐ Please have a West representative telephone for an appointment.

Name .....

Position .....

Mail this coupon with your letterhead to Dept. 13

For more facts circle 532 on Reply Card

GO AHEAD...

explain nuisance tripping to him

Heat's on, conditioner's out. How come?

Some annoying power interruptions are due to inadequate wiring. A vast number are due to nuisance tripping of circuit breakers or nuisance fuse blowouts.

Fuses and many circuit breakers operate on the basis of heat. They are sensitive to heat from within the circuit and without. Thus, on hot days thermal protectors are often near the tripping point even though the circuit is not fully loaded. As heat builds up, nuisance tripping results.

Heinemann hydraulic-magnetic circuit breakers *ignore heat*—respond only to *current* (amperage) which is the true determinant of electrical load. These circuit breakers will carry the full, safe capacity on the hottest days. Nuisance tripping just doesn't occur.

In Heinemann circuit breakers, actuation is entirely magnetic; inverse time delay is provided by hydraulic means. When protection is needed, interruption is fast. When the circuit is safe, power stays ON.

***For consulting engineers,* the full story is given in an informative booklet, Manual 101: "What You Should Know About Circuit Breakers." Write for your copy.**

HEINEMANN

HEINEMANN ELECTRIC COMPANY
128 Plum Street, Trenton 2, N. J.

Circuit breakers

SA 1418

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

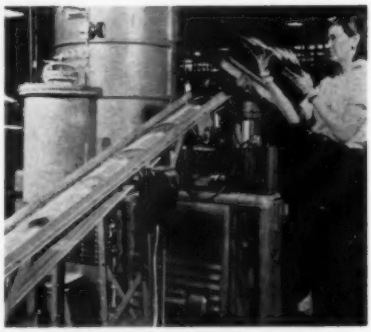
(Digest begins on page 42)

used only once, use of the rags was expensive.

Paper wipers, tested in the speaker subassembly department left no fuzzy deposit on the parts or workers' hands. In addition, the wipers are used for cleaning parts with a ketone solvent. They are also used to remove the tacky cement from the workers' hands to permit easy handling of small parts.

Subsequent use of the paper wipers in the speaker assembly department proved successful for removing powder and dust from voice coils, excess grease from arbor molds, cement from parts and bulb-type cement dispensers and solder from tips of soldering irons. *From a release of Scott Paper Co., Chester, Pa.*

Magnets Prevent "Flying Saucers"



Magnets underneath fast moving conveyor belt prevent can ends from flying off at National Can Co. (From Inco Nickel Topics, published by International Nickel Co., Inc., New York, N.Y.)

Coatings for Fasteners

Because accelerated salt spray tests of metallic coatings for fasteners favor those coatings which can endure continuous moisture and salt atmosphere, whereas some do better under normal, intermittent dry and wet conditions of weathering, a "scale" of suitability of various coatings has been developed, based on field experience, by our engineers.

Hot galvanizing provides the coating with greatest endurance under most conditions. It is not the best

tor highly prestressed fasteners, such as high tensile bolts and other high strength fasteners. When preload tension brings the base metal into its elastic range, as it should, the hot galvanized coating may flake or crack.

Electro-deposited zinc is the most practical coating next to hot galvanized. It provides good appearance, controlled tolerance of threads, and ability to take high bolt tensions without flaking or cracking.

Cadmium plate stands up well where salt atmospheres predominate. Because it isn't suitable for contact with edibles, it is ruled out for products such as kitchen appliances.

Rust preventing characteristics of black oxide coatings prove satisfactory for general applications.

Phosphate coatings offer a limited degree of protection and provide a good base for paint.

Chromium plating over copper should be considered more for its appearance than for protection. *From a release of Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y.*

Control Chart Speeds Handling

CLOSE CONTROL of goods in Federal Pacific Electric Company's new warehouse in Newark, N. J., is possible by the use of a special control chart. The control chart provides an instant visual check on the position

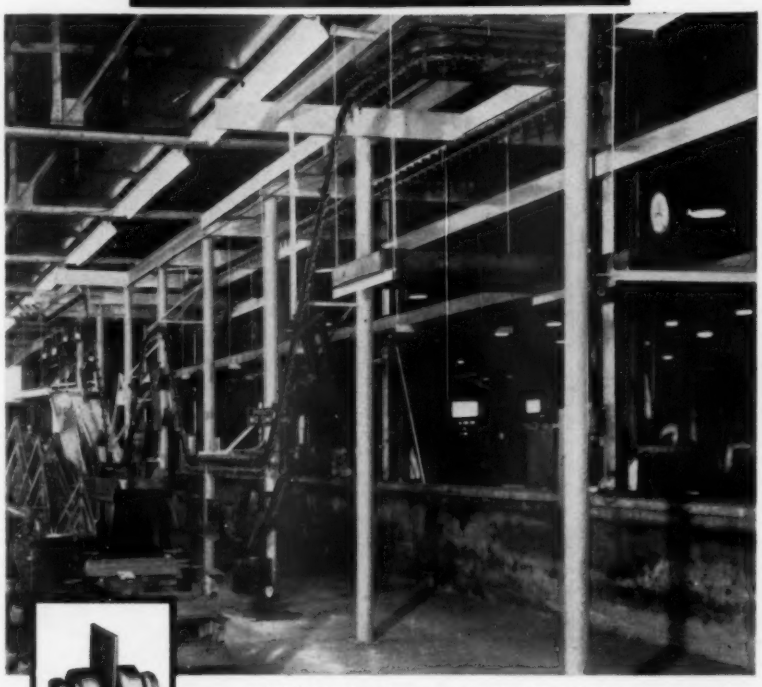
Control chart provides visual check on location of goods and available storage

of goods on hand and the availability of space for storage. Different colored pegs are used to indicate one, two or three empty locations.

Movement of industrial trucks with palletized loads is directed from this control station by means of a 465 mc two-way radio. *From a release of Federal Pacific Electric Co., Newark, N. J.*

A NEW LIGHT-DUTY TROLLEY CONVEYER . . . ENGINEERED AND STANDARDIZED BY

MATHEWS



A #232 Trolley Conveyer Applied for painting, drying and storage of miscellaneous parts.

This light-duty Trolley Conveyer has several features which make it a leader in the field of overhead conveying. It is comparatively easy to install, with hanger-rod and angle hanger supports available to meet any supporting requirements. Standard turns, vertical bends, and takeup assemblies are made in sizes and types to fit even the most difficult layout.

The drive units have a wide range of capacities and horsepowers, with conveyer speeds ranging from one to fifty feet per minute.

The #232 wheel was specifically designed for trolley conveyer service **and is an outstanding performer. This equipment is priced reasonably and is available from stock, being assembled from standard parts throughout.**

Write for Bulletin T-58 today.

MATHEWS CONVEYER COMPANY

GENERAL OFFICES . . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

MATHEWS

Over Fifty Years of Leadership in Mechanized Handling

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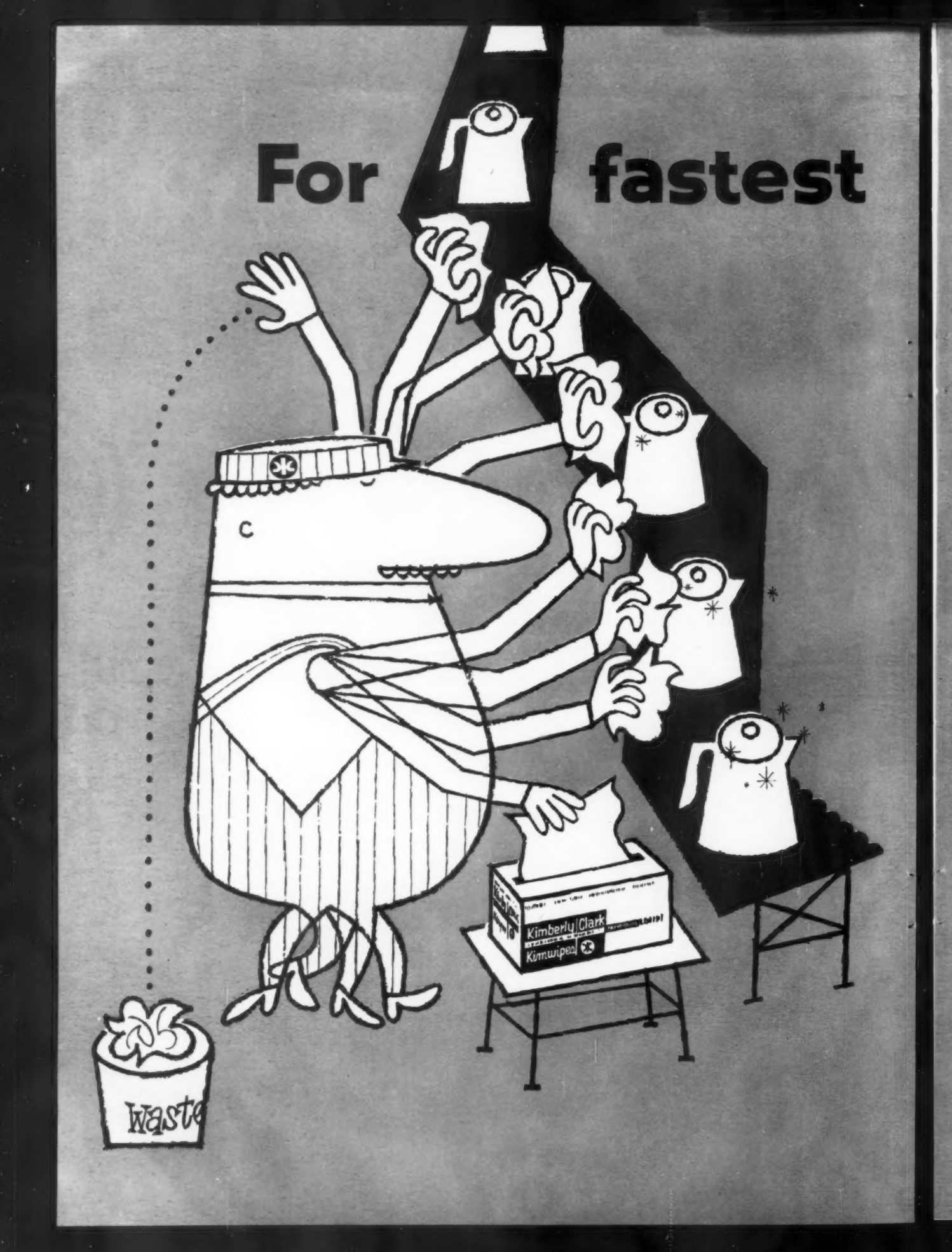

For
fastest
Kimberly Clark
Kimwipes
Waste

no-scratch wiping

Kimwipes®

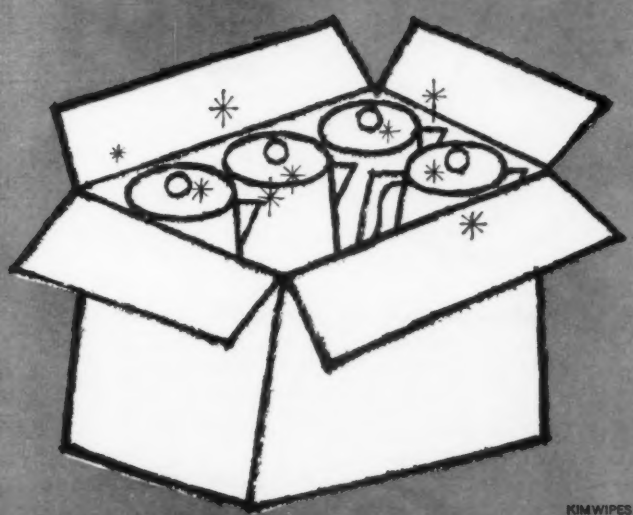
INDUSTRIAL WIPERS

Kimwipes Industrial Wipers wipe out laundry bills, rag collecting, pilferage. Save money, workers' time, production costs. Pop up like Kleenex tissues in cartons or wall dispensers.

For positive proof of outstanding performance ask to see comparison demonstration. Ask your supplier or write to Kimberly-Clark, Dept. PE-38,, Neenah, Wisconsin.

Use Kimwipes in:

Laboratories
Production lines
Machine maintenance
Inspection departments
Tool rooms
Print shops
Finishing operations
General plant use



Kimberly Clark
INDUSTRIAL WIPERS
Kimwipes

Kimwipes are made by the makers of Kleenex tissues

Kimberly-Clark Corporation
Neenah, Wisconsin

KIMWIPES and KLEENEX are trademarks of Kimberly-Clark Corporation

For more facts circle 535 on Reply Card

Announcing

another outstanding development soon to be available by the makers of BUSS FUSES

FUSETRON

LOW-PEAK

FUSES

Have

CURRENT LIMITING

added to

High Interrupting Capacity

and

Long Time-Lag

Made in all standard sizes above 60 amperes

FUSETRON Low-Peak Fuses are made in all standard sizes above 60 amperes—both 250 and 600 volt ranges.

In 60 amperes and smaller sizes tests show that FUSETRON dual-element fuses have sufficient current limitation to protect circuit and components in all normal cases.

Now you can have a high degree of protection against the thermal and mechanical stresses that heavy fault currents often impose on switches or other circuit components.

FUSETRON Low-Peak Fuses have a current limiting element that cuts off fault current so fast that it cannot build up to a damaging peak.

These new FUSETRON Low-Peak Fuses are built on the same principle as FUSETRON dual-element Fuses. They have:

the same High Interrupting Capacity

the same Time-Lag to hold harmless current surges

PLUS Greater Current Limitation to restrict fault currents to a LOW PEAK

FUSETRON Low-Peak Fuses can be interchanged with FUSETRON dual-element Fuses.

Where their use is required in any part of the electrical system, they can be installed without upsetting proper coordination over the range of useful loads and normal faults.

Hence, their application requires no testing or complicated calculations.

They are designed for use to protect circuits and components that might be damaged by the thermal and mechanical stresses of peak fault currents if other protective devices are used.

If planning new installations, keep FUSETRON Low-Peak Fuses in mind for those locations where peak fault current must be held to a low value.

BUSSMANN MFG. DIVISION

UNIVERSITY AT JEFFERSON, ST. LOUIS 7, MO.

McGRAW EDISON

For more facts circle 536 on Reply Card

RHOADS

Since 1702 . . . Pioneers in Mechanical Power Transmission

WHERE THE JOB SELECTS THE BELT

In the Rhoads "family" there are now *three* distinct types of beltings — leather beltings; all synthetic beltings of fabric and plastic; and leather beltings with a nylon core (see details below). Each is built to Rhoads standards of quality and each has a record of proved performance in particular fields of power transmission.

Back of these three distinct types of beltings is Rhoads Engineering — an organization of specialists in mechanical power transmission, whose business it is to learn precisely *all* the conditions under which the belt must work and *all* the details of the job to be done . . .

Based on this information, and against a background of broad experience, Rhoads Engineering works with the customer or the belting engineer, (1) on the selection of the proper type of belting, and (2) on the development of a belt that is engineered to meet each condition and to do the job at hand most efficiently and economically.

The job selects the belt.

Let us tell you more about the Rhoads "family" of beltings. And more about Rhoads Engineering, and what it can mean to you in better performance in power transmission on every type of job . . . from the smallest spindle drive in a textile mill to the smooth, unbroken flow of power for a lineshaft-driven papermaking machine . . . and under every condition, from water and moisture through dust and oil to steam, high temperatures, or excessive dryness. Address Engineering Department, J. E. Rhoads & Sons, Wilmington 99, Delaware.

Tanastic

with the strength of nylon . . . the grip of leather

TANASTIC — newest member of the Rhoads family of beltings is the leather/plastic which provides an elastic, stretch-free belt that holds its driven speed for the life of the drive, without tension adjustment.

TANASTIC's greater tensile strength, from its core of nylon, permits narrower widths . . . reduces costs. High friction coefficient allows shortest center distances. Well-adapted to multiple pulley drives, crossed, quarter-turn and cone drives. With TANASTIC, you can use pulley ratios as high as 20:1 . . . at contact arcs as low as 90° . . . with speeds to 10,000 fpm . . . at capacities to 500 hp and over!

For more facts circle 537 on Reply Card

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vernon T. Kempf

Check Torque Wrenches Fast

PROPER BOLT TENSION is a critical factor in the assembly of a refrigeration compressor to insure a long and effective service life. At Copeland Refrigeration Corporation, Sidney, Ohio, quality control technicians make sure every bolt used in compressor manufacture has the proper tension by checking all torque wrenches daily in a torque wrench calibrator.

This instrument, manufactured by Skidmore-Wilhelm Manufacturing Company, Cleveland, is a portable hydraulically-operated device which indicates whether micrometer settings on torque wrenches are correct. When used in the shop, the micrometer settings of torque wrenches vary considerably from actual torque that is being developed.

Accurate torque wrench settings are made with this simple hydraulic device

To check the wrenches, it is only necessary to insert the square drive of the wrench into the coupling of the calibrator and use the wrench as if tightening a bolt. The torque setting on the wrench is then checked with the figure shown on the gage of the calibrator. The micrometer is reset until it delivers the proper reading and is then locked in place.

How To Select Tapping Screws

PROPER SELECTION of tapping screws will provide easier assembly and greater assurance of a sound joint, according to specialists at Russell, Burdsall and Ward Bolt and Nut Co. There are several important factors to consider in selecting tapping screws.

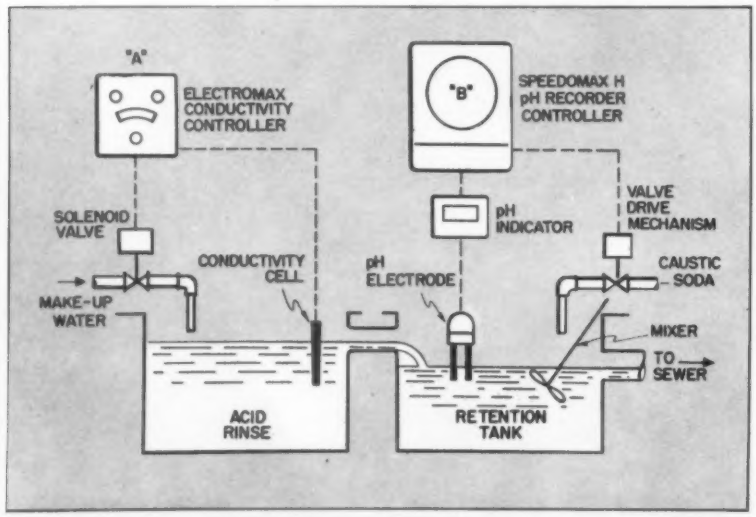
(Continued on page 60)

Controls Save Water and Convert Acid Waste to Safe Effluent

NEUTRALIZING acid wastes before they are discharged into the municipal sewage system and conserving water is controlled automatically at the Leeds & Northrup Company's new plant located at North Wales, Pennsylvania.

Water consumption and acid wastes are part of a bright dip process used to clean instrument parts before they are soldered together.

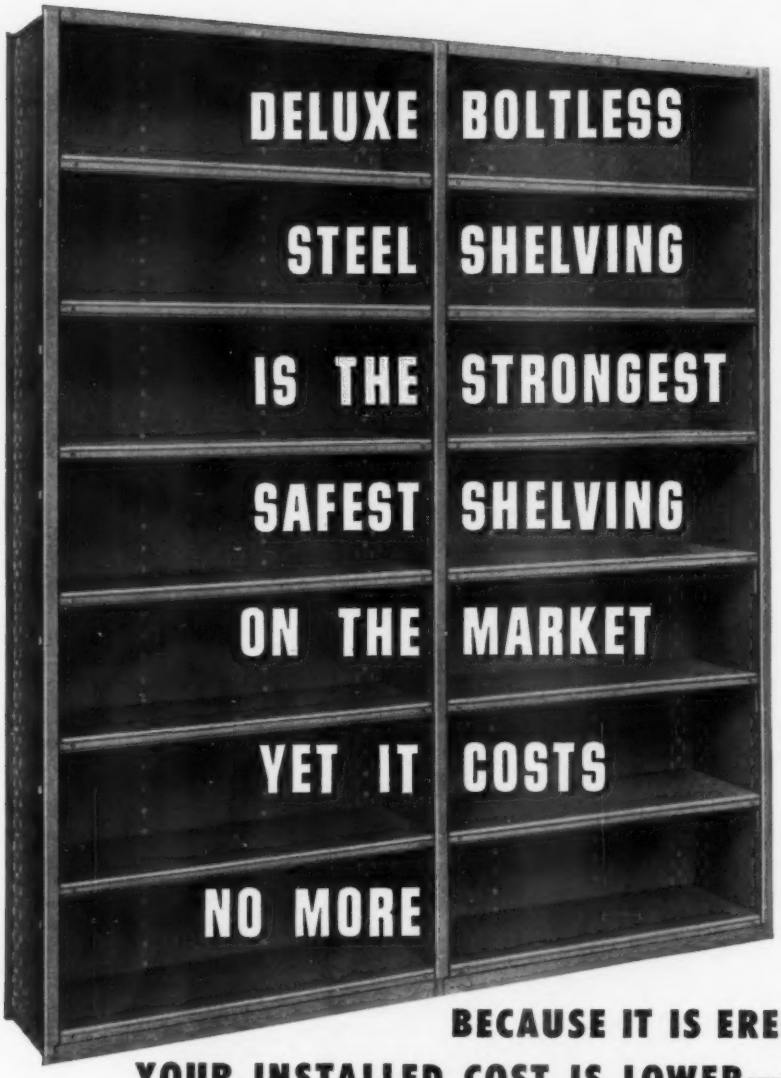
Two conditions had to be met before this process was installed. One was to minimize the amount of makeup water used to keep the rinse water sufficiently neutral. This problem was solved by a system that continuously measures conductivity of the cold rinse tank. When the rinse bath becomes too acid, a controller opens a solenoid valve in the makeup supply line. By adding makeup water only when needed, instead of continually, this system holds water consumption to a minimum.



Controller A measures conductivity of rinse to determine makeup water needed. Controller B monitors pH of effluent and adds caustic soda to neutralize acid

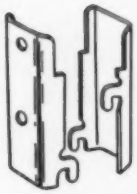
The second problem was to hold effluent to a legal pH level during discharge into the borough sewage system. Before the acid rinse water is discharged into the sewer lines, it flows into a small retention tank installed behind the rinse tank. Here, pH is continuously detected by an electrode assembly, which translates pH into a proportional millivolt output.

This output is fed to an industrial type indicator which amplifies the voltage and feeds it to a recorder-controller. The controller plots a 24-hr record of effluent pH and feeds a control signal to a valve drive mechanism. This regulates the addition of caustic soda to the rinse water in the retention tank. Mixers agitate the solution so that the caustic soda reagent is evenly distributed in the tank to bring the pH of final effluent to legal level of 7.5.



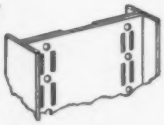
BECAUSE IT IS ERECTED FASTER
YOUR INSTALLED COST IS LOWER—*HERE'S WHY*

BOLTLESS SHELF BRACKET



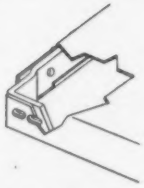
For easy adjustability, you merely insert four to a shelf—with absolutely no tools or special equipment needed.

ONE-PIECE BIN-TYPE UPRIGHT



Single upright member between sections provides faster erection, more rigid assembly. I-beam construction for greater strength.

FACTORY BUILT-IN SHELF REINFORCING



Reinforcing bars are imbedded in the shelves at the factory, eliminating many erection crew man hours and costly erection time.

OTHER DELUXE ERECTION TIME SAVERS

- Snap-in dividers
- Clip-on bin fronts
- Bottom shelf support and floor angle which permits shelving to be erected vertically in place.

For assistance in planning your stockroom and other storage problems and for fast friendly shelving service, call your local Deluxe dealer. He's listed in the Yellow Pages, under *Shelving*, or write for name of dealer nearest you. See for yourself why Deluxe boltless steel shelving is strongest, safest, and fastest erected. Write for new Catalog No. 30. Deluxe Metal Furniture Company, Warren 7, Pa. A Division of Royal Metal Mfg. Co.

DELUXE
STEEL SHELVING

For more facts circle 538 on Reply Card

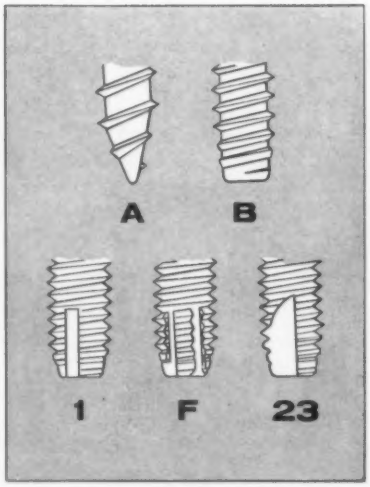
OPERATION—PRODUCTION

(O and P begins on page 58)

Of the five common types of tapping screws in general use, two are thread-forming and three are thread-cutting. The thread-forming screws, types A and B, should be used when the material is ductile enough to permit the deforming action of the screw. Type A is pointed and is used in pierced rather than drilled holes.

Where types A and B screws cannot be driven, due to the hardness or thickness of the material, one of the thread-cutting types should be used. For hard ductile materials, Type 1 is best. For soft friable materials Type 23 should be used. Type F, which has four equally-spaced longitudinal slots, drives straighter than the other types.

Where load is no factor, thickness of the metal determines the diameter



Five types of tapping screws designed for different materials and conditions

of the screw. Use a screw with thread pitch that will give at least one full thread engagement in the metal. For example, with metal 0.0625-in. thick, any screw with at least 16 threads per inch can be used.

Where load is a factor, select a screw with sufficient strength and one that provides four or five threads fully engaged. If the screw that is large enough to develop sufficient holding power does not provide sufficient thread engagement, a greater number of smaller screws should be used.

Size of the hole in the metals to be joined is important. If the hole is too large, the screw cannot develop sufficient thread depth and if it is too small, the screw will be difficult to drive. The required hole size will vary with the thickness of the material, type of material and style of screw.

Tool Library Saves Time

SELF-SERVICE tool rooms solve the problem of getting workers to the job early, because they provide fast and efficient service. Ordinarily tool room attendants work frantically during the first hour of the day to serve a long line of waiting men.

Studies made at Pearl Harbor

(Continued on page 62)

Infrared Heaters Radiate Heat Directly to Workmen

COMPANIES with areas too large to heat with a central heating system are finding the solution to this problem in infrared lamp sections. Paxton and Vierling Iron Works, Omaha, Neb., uses portable units to warm the workers by directing radiant energy at the work station. The infrared beams heat only the solid objects they fall upon, not the surrounding air.

Small groups of personnel can be comfortable under the exposure of these units, made by the Fostoria Pressed Steel Corporation, without the expense of heating large, open spaces. They can be readily moved from place to place without complicated installation.

The units heat up instantly so they can be turned off during lunch. The bulbs are a deep red color and transmit heat with a low level of light. There is generally no problem of glare from a properly designed unit.

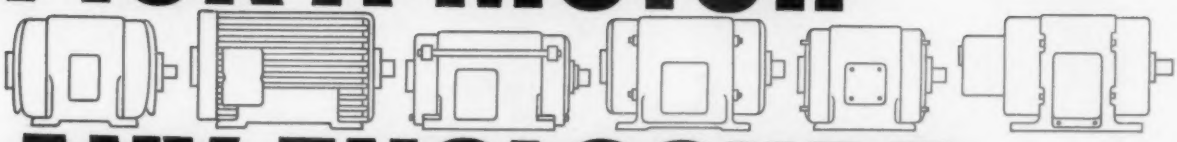
In areas where supplementary light is needed, the units can serve a dual purpose. White incandescent bulbs can be installed in some of the sockets, providing comfortable heat and safe illumination at the same time.

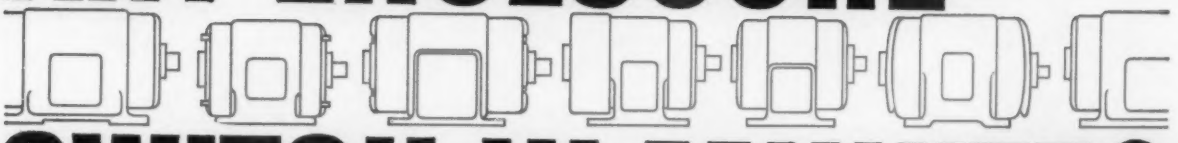
Portable infrared heating unit warms workmen in layout area

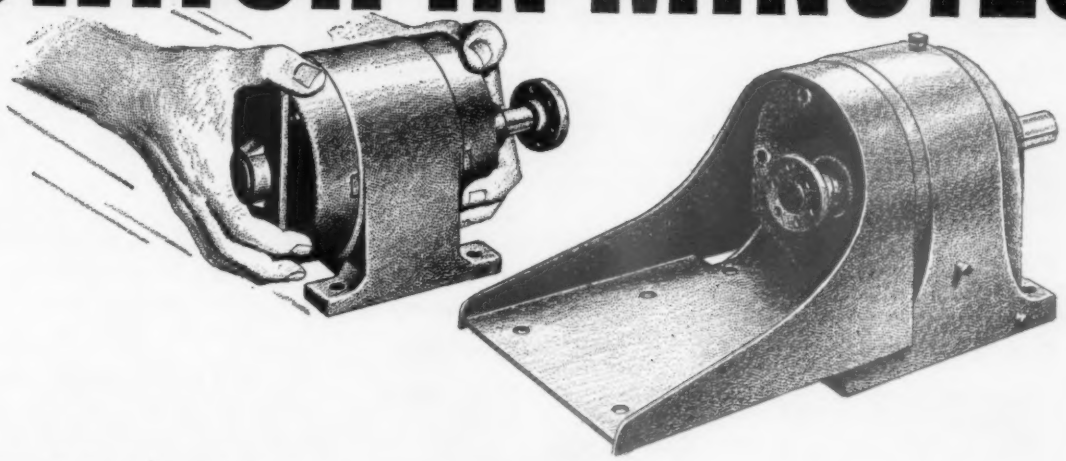
Fixed unit below plate shear table provides comfortable heat

With a LINK-BELT Motogear—you can

PICK A MOTOR ANY ENCLOSURE SWITCH IN MINUTES







DESIGNED for bracket-mounting foot-type motors of *any* manufacturer, Link-Belt Motogears radically slash delays in making motor replacements. Remove four bolts, disengage the coupling, re-assemble with another motor —and it's ready for work. No need to drain oil. And no re-alignment problems — the bracket assures accurate positioning of the motor.

Link-Belt Motogears are immediately available from nearby stocks, in sizes to 100 hp, output speeds from 280 down to 1.8 rpm. Call your Link-Belt office or authorized stock-carrying distributor. Refer to the yellow pages of your local telephone directory under the heading "Speed Reducers."

ASK FOR BOOK 2447 — contains features and data on Link-Belt Motogears. Also covers Gearmotors — with flange-mounted NEMA motors—and Electrofluid Motogears with *"Cushion Action."*

LINK-BELT

SPEED REDUCERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

14,788

For more facts circle 539 on Reply Card

Designed with the Look of Tomorrow by Raymond Loewy Associates

NEW PARTLOW MFS TEMPERATURE CONTROL

New Looks, Convenience, Efficiency for Your Process Equipment

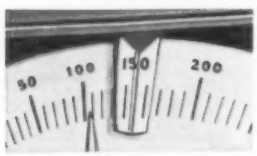
Striking as they are, good looks are only part of the story of Partlow's spectacular new control. Inside and out, the MFS is as rugged and efficient as a temperature control can be, its tough mercury-actuated element having been built to retain sensitivity and accuracy even under extreme conditions. Convenient, too! You can interchange the mercury element right out in the field . . . no factory adjustment is required.

The MFS comes in 10 scale ranges. Accurate within ½ of 1% of scale range, it is especially adaptable to control applications where temperature variations must be kept at a minimum; or where sudden temperature changes demand instant response.

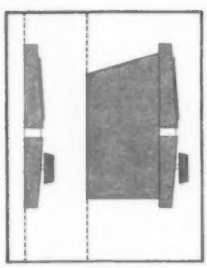
If your product or process requires close, positive temperature control within the –30° F. to 1100° F. range, you are invited to test this advanced new instrument soon. Write, wire or phone today.

THE PARTLOW CORP.
DEPT. PE-358, NEW HARTFORD, N.Y.

Only in the Partlow MFS so many important innovations:



Accu-Vision Dial — Magnified pointer for closest settings. Dial calibrations, pointers and background scientifically color-contrasted for easy readability — even at a distance.



Flush or Wall Mounting — No additional brackets or hardware are required. Case is grey reinforced plastic —tough, lightweight, easy to clean, won't crack under extreme temperatures.

LOOK TO PARTLOW FOR:
Recording Controls
Indicating Controls
Non-indicating Electrical Controls
Non-indicating Mechanical Controls
Timers
Recording and Indicating Thermometers
Limit Controls
Combustion Safeguards

PARTLOW

For more facts circle 540 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 58)

Naval Shipyard and reported recently in the Bureau of Ships Journal reveal that self-service issues are made in less than half the time required when an attendant served each customer separately.

In the Pearl Harbor self-service tool rooms, borrowing a tool is now as simple as borrowing a book from the public library. Every shop employee is issued a tool charge plate similar to that used for credit accounts in department stores. The plate shows his name, badge number, and the shop where he is employed. It is the authority to borrow tools from any tool crib.

A borrower enters the tool crib and locates the tool he needs with the aid of a tool directory. He takes the tool, together with the corresponding chit, to the attendant who imprints the chit with the name and badge number of the borrower. One copy of the chit is given to the borrower, one copy goes to the charge file, and two copies go to tool control for statistical purposes.

Tools are returned to the tool room attendant, who clears the workman of his charges, inspects the tool, and returns it to the bin if it is in good condition. Tools requiring sharpening, repair, or reconditioning are sent to a central repair station.

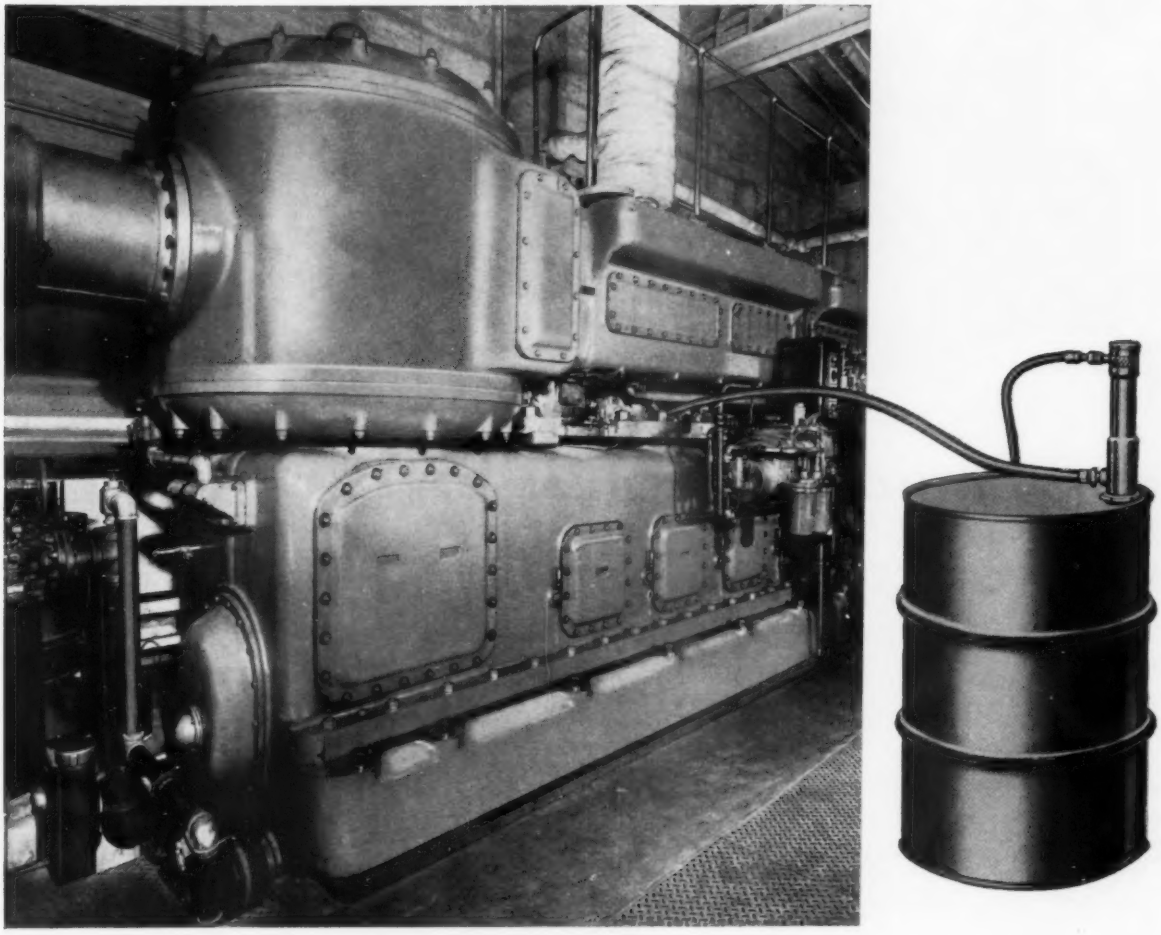
The main advantage of self-service tool rooms is the production time

$10.00 Reward

WANTED . . . . Items of interest to plant engineers.

PLANT ENGINEERING will pay $10.00 minimum for each item accepted for publication. These items should describe a useful improvement or modification to plant equipment and buildings or more efficient use of any facilities. Where applicable, items should be accompanied by a sketch and/or a photograph. Send all entries to Editor, PLANT ENGINEERING, 308 East James Street, Barrington, Illinois.

Varnish Problem Vanishes!



Stop the formation of harmful **varnish,** sludge and carbon in your Diesels and *keep it stopped* with Sinclair RUBILENE® or RUBILENE HD, the high viscosity index oils proved by over 35 years in industrial Diesel applications. RUBILENE earns its reputation by its performance under continuous operation and heavy loads. It fights deposits and gives better protection to cylinders, pistons, rings and other vital moving parts. Your Diesel stays on the job longer . . . service time is cut 'way 'way down.

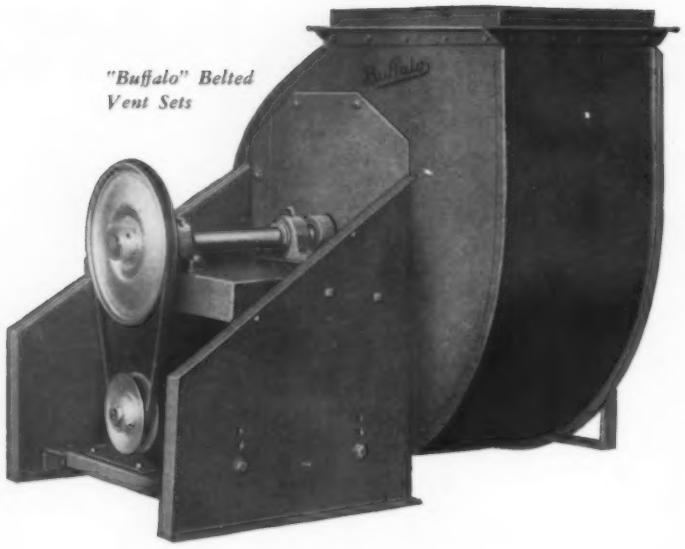
Let RUBILENE help solve *your* lubrication problems. Regardless of the make of your Diesel, there's a member of Sinclair's RUBILENE or RUBILENE HD family that meets your requirements. Call your local Sinclair Representative for further information, or write for free literature to: Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. *There's no obligation!*

Dino, the Sinclair Dinosaur, says:

"Send *now* for free literature on RUBILENE!"

SINCLAIR RUBILENE® OILS

For more facts circle 541 on Reply Card



"Buffalo" Belted Vent Sets

ECONOMICAL VENTILATION FLEXIBLE TO FIT YOUR PLANT REQUIREMENTS

You can get economical, efficient plant ventilation — to match your specific needs — at a low cost you might not have thought possible. The answer is "Buffalo" Belted Vent Sets . . . the versatile "ventilating packages" with many unique advantages.

"Buffalo" Belted Vent Sets are *completely* FLEXIBLE for:

- **Small, Independent Plant Systems**
- **Larger Systems with Variable Requirements**
- **Separate Systems in Different Parts of Your Plant**

"Buffalo" Belted Vent Sets are delivered as compact, easy-to-install packages. They can be used indoors or outdoors as multiple units, or installed separately to augment your present ventilating facilities. They're extremely flexible because the capacity of each fan may be readily changed at any time to meet future requirements.

Unusually quiet and efficient, Belted Vent Sets have all the important engineering features of the famous "Buffalo" fan line: superbly designed inlet vanes — backward-curve blades with Limit-Load® non-overloading characteristic — factory-balanced rotors.

Available in capacities from 500 to 20,000 cfm . . . if desired, with all-weather drive cover for roof or other outdoor installation. Special features are available for fume hood exhauster, or for induced draft service on small boilers handling gases less than 600°F.

"Buffalo" Belted Vent Sets are engineered and constructed to the famous high "Q" Factor standards of rugged dependability with a minimum of maintenance. The "Q" Factor is the built-in Quality which provides trouble-free satisfaction and long life in every "Buffalo" product.

WRITE FOR BULLETIN 3720-A TODAY!

BUFFALO FORGE COMPANY
BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

For more facts circle 542 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 58)

they save. However, there are several other advantages. Workmen select exact tool and feel satisfied they have the best tool for the job.

If a tool is not available, workmen can pick their own substitute for the job. They also become familiar with the great variety of tools available to them, and with new and better tools that come in. The system also saves the time of the tool room attendants. They now have more time to care for tools and keep them in good condition.

Plant Offices Relocated Fast

MOVABLE plant offices are unusual features of the new Minneapolis-Honeywell Regulator Company's plant at Wabash, Indiana.

Of Armco Steelox construction,

Unplugging electrical connection is only step needed to prepare this portable plant office for move to new location

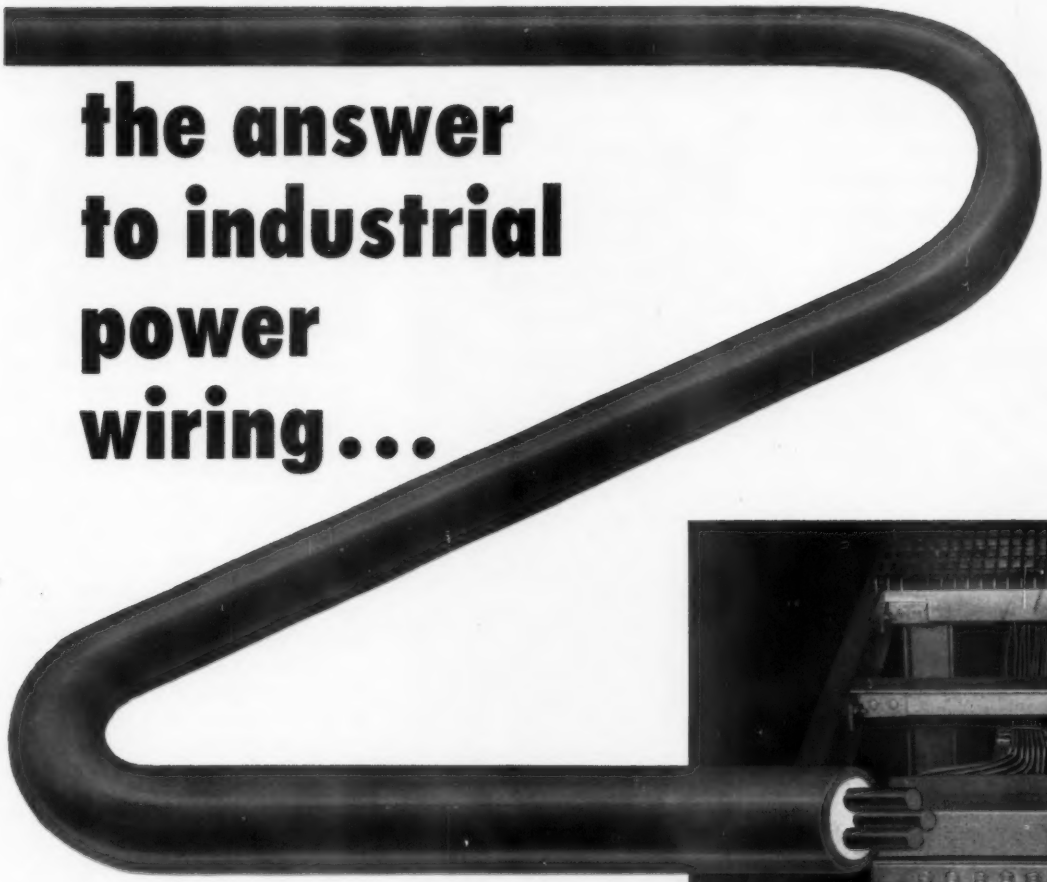
the offices are completely enclosed. Tile floors and sound-deadening walls and ceilings have been installed. The offices can be moved quickly to new locations inside the plant by unplugging the electrical connection, hooking on to a plant tractor and skidding them to a new area. Light and heat services are restored by connecting to the nearest overhead bus-duct.

Land Erosion Stopped

PLANT ROADS were being slowly eroded by a nearby stream at the Industrial Forge & Steel, Inc. Canton, Ohio. To permit normal truck

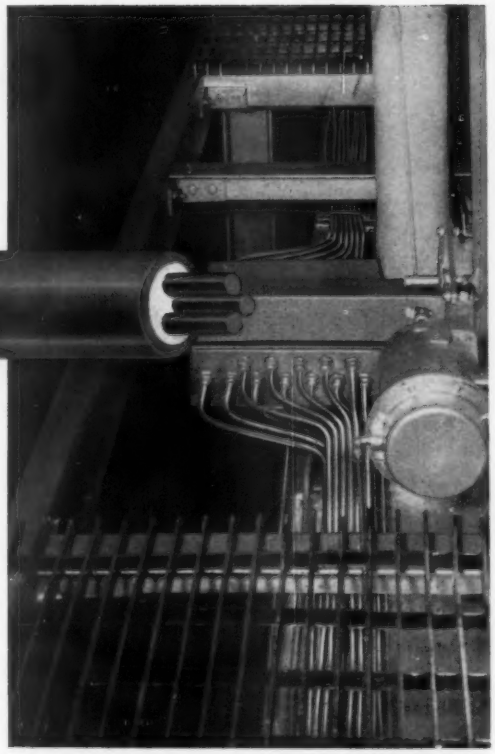
SAFETY m.i. CABLE

the answer to industrial power wiring...



- SPACE SAVING
- Time saving
- Permanent
- INSTALLED EASILY
- Fast power wiring to cut down-time

More and more General Cable's Safety MI 600 Volt Wiring System is being used because it can take the abuse of industrial application, giving trouble-free operation and unexcelled performance under the most severe conditions. Particularly adaptable in hot and wet locations. Available in 1, 2, 3, 4 and 7 conductor for power and control circuits.



MI terminating in main Japan Oven control center switchboard at Poinsett Lumber and Manufacturing Company, Anderson, S.C.

Ask for a Demonstration To-Day!

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.

Offices and Distributing Centers Coast-to-Coast

for quality and service...specify **GENERAL CABLE**

For more facts circle 543 on Reply Card

NOW···GLOBE OFFERS···
two new INTERCHANGEABLE trays for support of cables, wiring and tubing

★ Engineered for uniform design and easy installation
★ Steel or aluminum construction
★ Complete accessories for SPEEDIER Installation
★ No sharp edges to damage cables
★ Complete interchangeability

Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities— consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.

109

PRODUCTS DIVISION

The **GLOBE** *Company* MANUFACTURERS SINCE 1914

4016 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

For more facts circle 544 on Reply Card

OPERATION— PRODUCTION

(O and P begins on page 58)

Bin-type retaining wall recovers lost land and permits widening of plant road

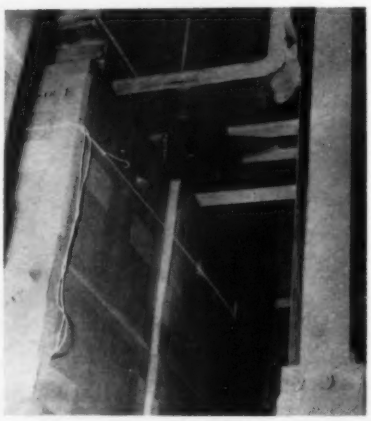
traffic into the plant, this erosion had to be quickly and permanently stopped.

A retaining wall, 380 ft long with a facial area of 6300 sq ft was installed to stop the erosion. The face of the Armco bin-type wall was curved to conform to the contour of the stream. The area previously lost to the stream has been recovered and the appearance of the bank has been improved.

Pallet Centering Saves Time

PLANT PERSONNEL at Bauer & Black have designed a device called a pallet-centering fork which assures more efficient stacking of three-stringer double-faced pallets in the company's Chicago warehouse.

It is used on an Automatic Trans-



Pallet-centering device helps to accurately align pallets on top one another

veyor which tiers pallets up to ceiling height in the company's raw material warehouse. Mounted between the lifting forks, the pallet-centering device engages the middle stringer of the pallet and centers it on the truck's forks. This allows the pallet to be tiered in alignment with the pallets beneath it with a minimum of truck maneuvering.

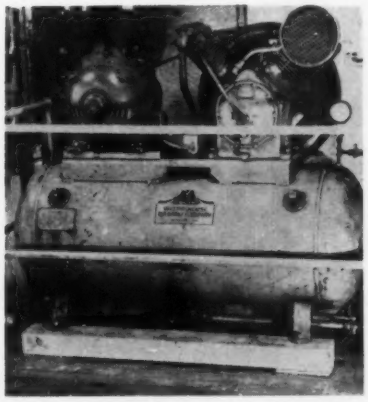
Handling Hot Sand at Low Cost

HOT SHAKE-OUT SAND shortened the life of conveyor belts at the I-F Manufacturing Company, a malleable iron foundry in New Philadelphia, Ohio. Subjected to the 300 F sand, the belts had to be replaced every three months.

To overcome this problem, two Solarflex belts made by the B. F. Goodrich Company were installed. The belts have been running 24 hours a day, five days a week for the past eighteen months with practically no maintenance. The four-ply belts are 330 ft long and 24 in. wide and travel 300 ft per min.

Stop Vibration to Reduce Costs

VIBRATION FREQUENTLY loosened the mountings of this air compressor mounted on a wooden floor at the Franklin Woolen Company, Franklin, Mass. To overcome this problem, two planks measuring four inches by six inches were bolted to the feet of the compressor. The unit was then mounted on four pieces of Air-Loc vibration absorption material placed at each corner. The unit has been operated in this manner for several months without additional attention.



Cushion between wood floor and compressor is provided by pads under skids

DAY

DUST CONTROL NEWS

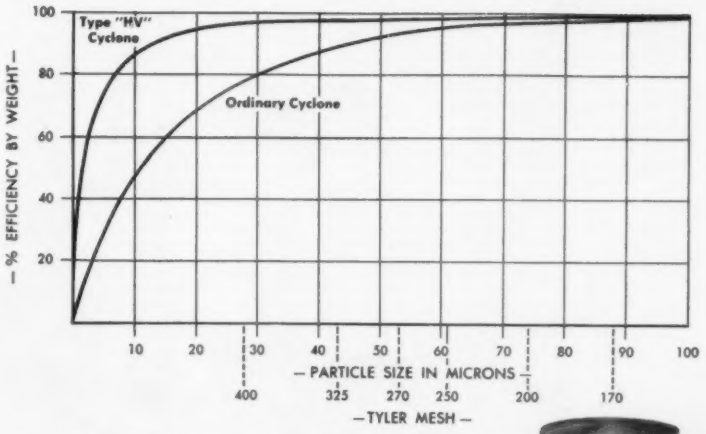


Chart above shows comparison of efficiency of DAY Type "HV" Cyclone and ordinary cyclone when collecting dust of equal density and particle size.

NEW high efficiency, low cost dust control

Highly efficient — yet economical: these are two of the most important features of the new DAY "HV" Centrifugal Dust Separator. The DAY "HV" costs less because it is made using high speed manufacturing methods and mass production techniques. Priced lower than many lightweight galvanized cyclones, this heavy duty, welded unit will outlast several of the lighter gauge separators.

The DAY "HV" will handle fibrous, granular, abrasive, fine and coarse dusts at normal or high temperatures. A complete range of sizes available.

For detailed information and performance data, write toDAY for Bulletin 576.

The **DAY** *Company*

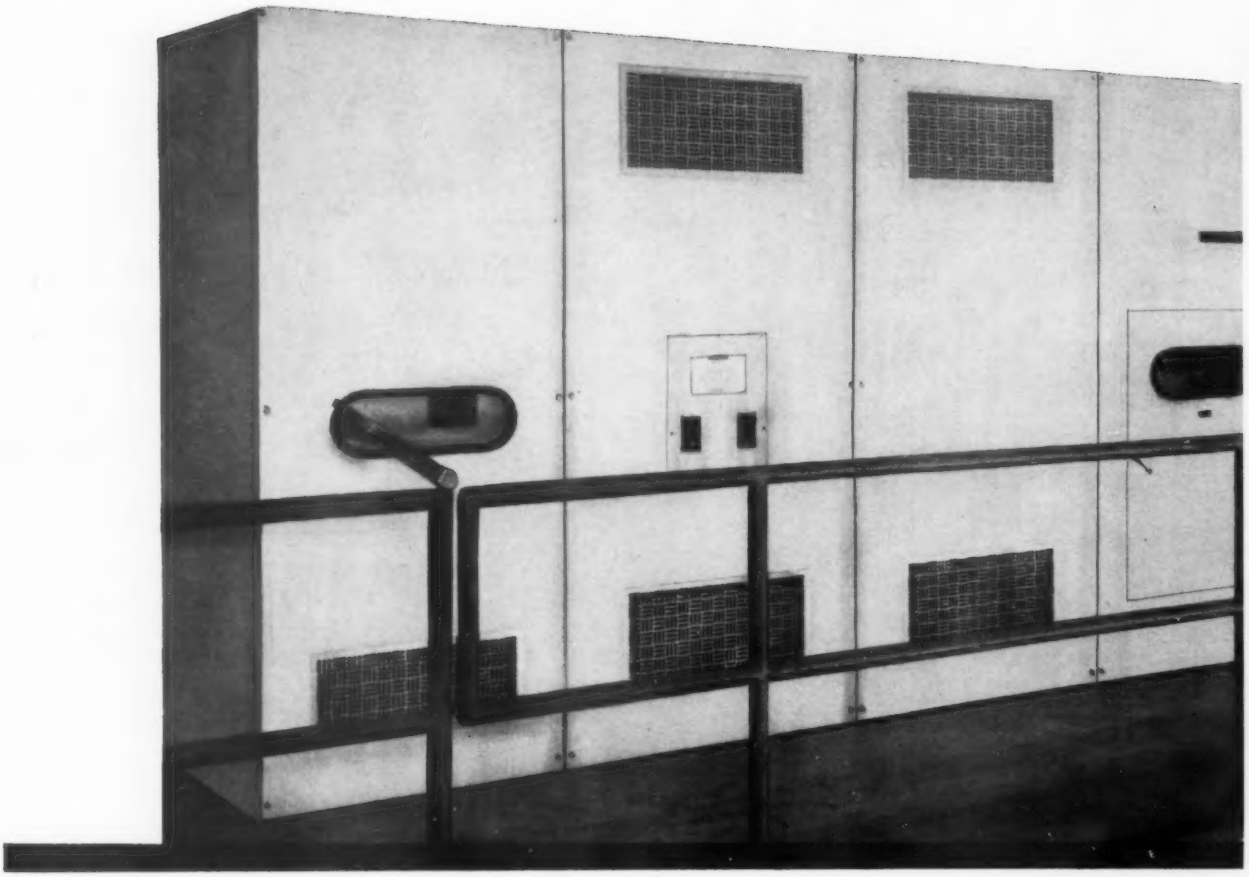
SOLD in UNITED STATES by
The DAY SALES Company
807 Third Ave. N.E., Minneapolis 13, Minn.

MADE and SOLD in CANADA by
The DAY Company of Canada Limited
P.O. Box 70G, Fort William, Ontario

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

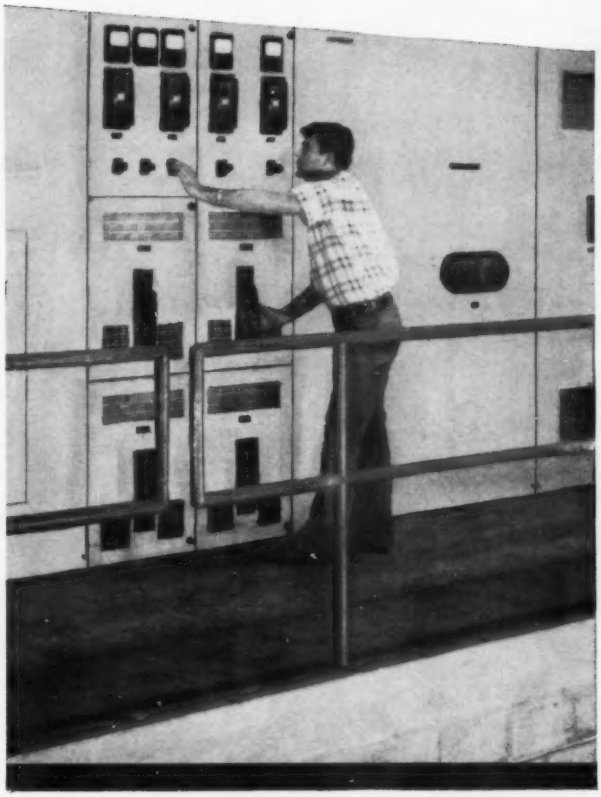
For more facts circle 545 on Reply Card



POWER-UP!

HARVEY ALUMINUM *did...*

doubled capacity, achieved more economical production than ever before!



Seven Westinghouse spot network power centers located in major production areas supply motor loads, induction and resistance-type furnaces and the mercury lighting system.

Harvey Aluminum doubled productive capacity and cut per-pound production costs as well. Their large-scale expansion program had called for extrusions of unprecedented weight and dimensions. Investigation proved that flexible high-voltage electrical distribution was the primary power requirement. Two incoming circuits at 13.8 kv established primary voltage. A spot network system, comprised of seven load centers, was installed at major load points and serves equipment throughout the plant through low-impedance and plug-in bus duct. This basic system is ideal for unbalanced and shifting furnace-heating loads.

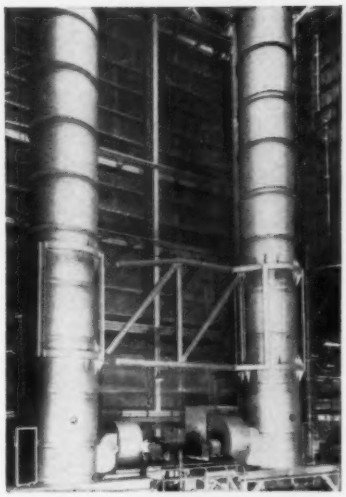
Service continuity is assured, and voltage regulation has measurably improved. Future relocation of machinery and unpredictable changes of equipment, too, have been provided for. This high order of electrical planning has helped maintain Harvey's position as one of the world's lowest cost producers of fabricated aluminum.

Is yours a problem of production changeover, new products, or rising costs and a profit squeeze? Your electric utility sales engineer or your Westinghouse representative can help you with a practical solution . . . Power-Up!

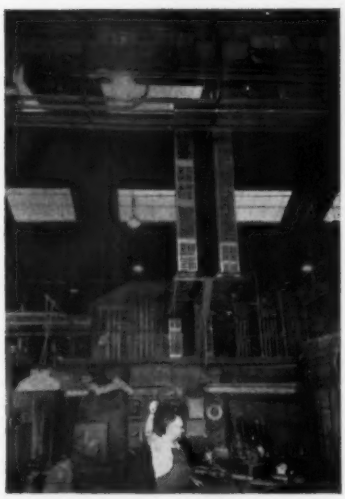
J-97218-A

"The Westinghouse 480-v color-corrected mercury-vapor lighting system is remarkably superior to conventional lighting," says Mr. Lawrence Harvey, Executive Vice President. "It is not only less expensive to operate at the same level of illumination, but replacement and maintenance costs are reduced."

Twin 110′ Westinghouse electric furnaces are powered by a specially engineered system providing for cyclical furnace loads, and at the same time, making maximum use of network capacity.



Westinghouse bus duct, carrying power throughout the plant, is another key to distribution system flexibility. Here, two runs of ventilated low-impedance duct from the transformer feed individual branch runs of 1000-amp plug-in duct.



YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 546 on Reply Card

introducing GULF

After 2 years exposure, Gulf Metalcoat A is still giving exceptional protection to the structural steelwork supporting this 40-ton overhead traveling crane.

METALCOAT A

the revolutionary new aluminum pigmented liquid coating that:

- protects metal surfaces against rust and corrosion up to 10 times longer
- protects under the most severe exposures in marine and industrial atmospheres
- is easy to apply by brushing, dipping or spraying—to either rough or polished surfaces
- is unaffected by temperature changes
- resists the abrasion of normal handling—yet can be easily removed by a petroleum solvent such as Gulf Stoddard Solvent
- costs less

New Gulf Metalcoat A has been passing the most rugged marine and industrial tests for 9 years! Salt spray tests at Wrightsville Beach, N.C., revealed that Gulf Metalcoat A gave from 7 to 10 times greater protection than that afforded by competitive products. In Philadelphia, overhead cranes in a shipyard have been perfectly protected by Gulf Metalcoat A for 4 years. Ships have used the new coating on stacks exposed to salt spray atmosphere—with outstanding success!

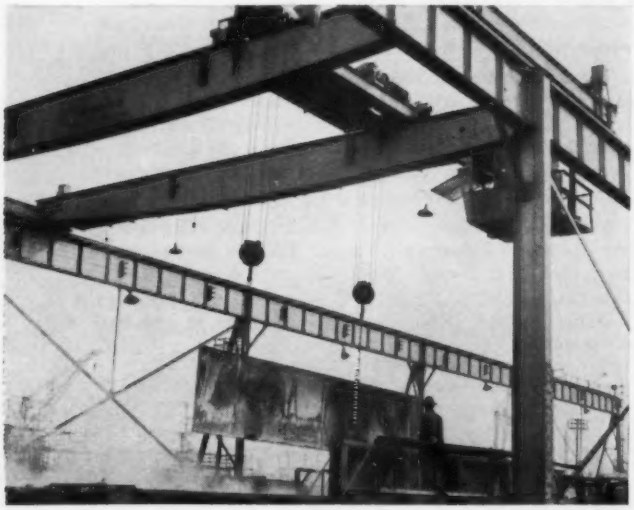
For longer-lasting protection, use new Gulf Metalcoat A on piping, fences, storage tanks, machine parts, transportation and marine equipment, ships, barges, metal roofs, stacks, sheet metal buildings. For temporary protection, Gulf Metalcoat A is excellent for structurals and steel components of all kinds which must be protected during storage or shipment.

Get complete details on new Gulf Metalcoat A by calling your nearest Gulf office. It's available now!

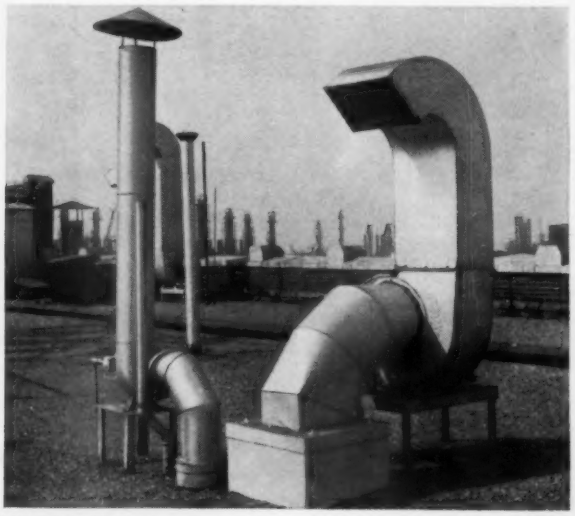
GULF

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

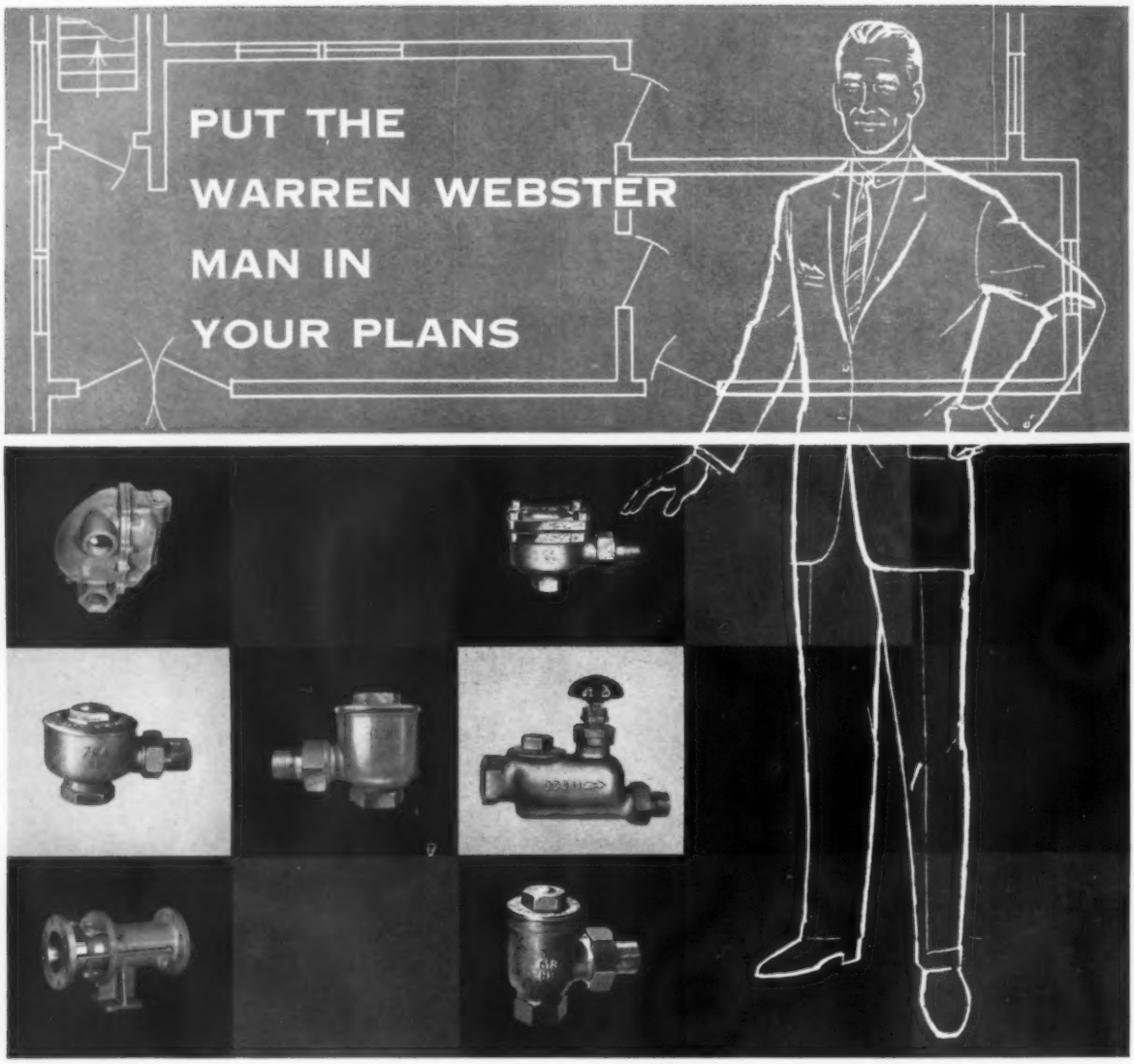
Gulf Metalcoat A has protected this steelwork for 4 years—above sulfuric acid pickling tanks! The coating is still in excellent condition.



These building exhaust ventilators, located in an extremely corrosive atmosphere, are kept free from rust and corrosion by Gulf Metalcoat A.



For more facts circle 547 on Reply Card



Ask Any Heating Man . . . And You'll Specify "Webster Traps"

Your Warren Webster Man knows traps . . . and any heating man knows the reputation for quality, performance and economy that's built into every Webster Trap.

Webster — the company that made the *first* thermostatic trap — makes a *complete* family of traps to meet every plant engineering need. Heavy-duty, lightweight, trouble-free Webster Series 27 Drip Traps in five sizes . . . thermostatic traps . . . process steam traps . . . dirt strainers — in fact, every steam specialty you need for uninterrupted dependability and low-cost, over-the-years operation.

For 70 years, Webster has made and sold Webster Traps. And today, the Webster line is still the industry's standard. Ask any heating man! Then talk it over with your Warren Webster Man. Or write for our Condensed General Catalog, Bulletin B-151. Warren Webster & Company, Camden 5, New Jersey. Since 1888. Offices in principal U.S. cities and Canada.

WEBSTER'S
FINEST
PRODUCT

the Warren Webster Man

WARREN WEBSTER

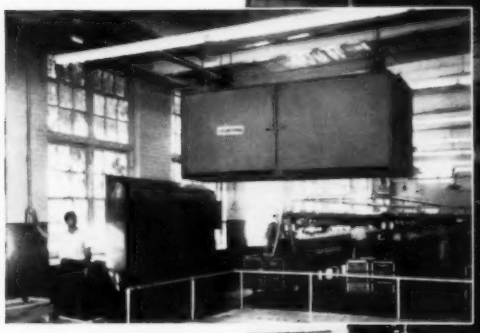
HEATING . . . COOLING

For more facts circle 548 on Reply Card

Automatic Handling System Brings **BIG SAVINGS**

Operates Between Buildings Without Operator

A Tramrail freight-carrying van leaving one building. Building doors open and close automatically. Tramrail track is high and above interference with railroad. The entire handling system is very safe.



Operator pushes wall button to start van on its way. Van rises until it reaches Tramrail carrier on track. Then carrier hauls van to building selected.

RAIN or shine, this Cleveland Tramrail system works without complaint. Inclement weather is of no concern, because no one has to go outside to operate this system.

The Tramrail freight-carrying van travels between buildings as directed by the touch of a pushbutton. It goes up and down grades and handles materials between different floor levels.

No regular operator is needed for this type of system. Usually the time required to dispatch loads is so little that production workers can do this along with their normal duties.

Great savings are made with Cleveland Tramrail automatic handling systems. They cut handling time enormously. They operate overhead above usual floor traffic and hindrances. They save floor space. They eliminate expensive floor repairs which floor conveyances make necessary. Tramrail equipment requires far less maintenance than usually is necessary with other types of conveying equipment.

Because the dividends are large and immediate when you install a Cleveland Tramrail automatic handling system, it will be to your interest to get the facts on what Cleveland Tramrail engineers can do for you.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

Write for free "Automatic Handling" booklet.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7535 E. 290 ST. • WICKLIFFE, OHIO

For more facts circle 549 on Reply Card

For more facts circle 550 on Reply Card →

Correct Lubrication in Action . . . in the

Maintenance cost cut

Mobil

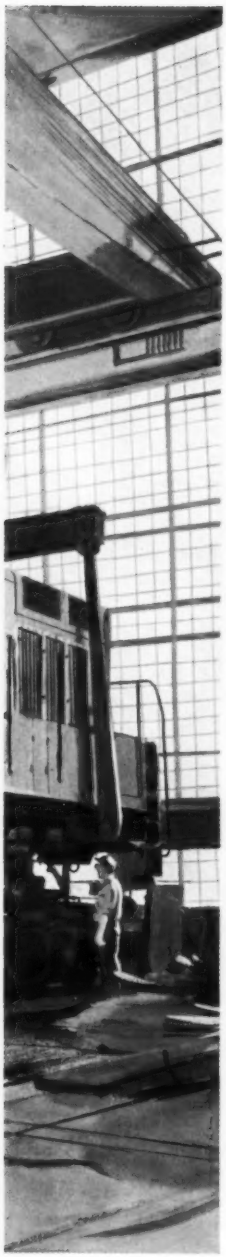
Complete Engineering Program
Proved Petroleum Products

Mobil

SOCONY MOBIL OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

Heavy Equipment Industry!

$58,500 in one year!



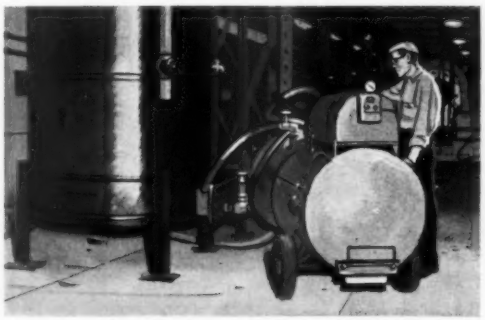
One of the many maintenance and production savings achieved by Fairbanks, Morse & Company with the help of Socony Mobil

In 1949, Fairbanks, Morse & Co. installed a Mobil Program of Correct Lubrication. This decision has continually paid off, as it can for you, by directly contributing to company profits.

To illustrate: First year after installation of a Mobil Program in the company's Beloit, Wisconsin plant figures showed machine repair maintenance costs were reduced 26.3 percent . . . $58,500. In fact, plant supervisors and Mobil engineers have co-operated so effectively under this service that today . . . nine years later . . . the Program shows continuing benefits, with the result that machine repair maintenance costs are now 49 percent lower than when the Program was inaugurated.

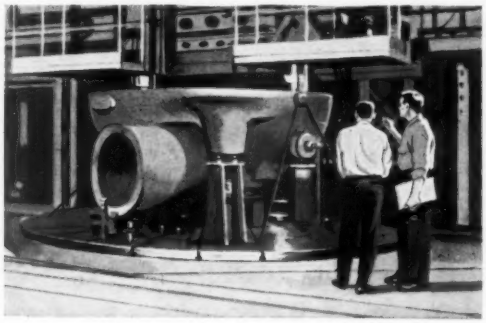
In dollars, this saving yearly is in excess of *twice the cost of plant lubricating oil requirements.* Here is another example of how Correct Lubrication in action can reduce maintenance costs and *increase profits.* It proved effective for this leading builder of heavy equipment. Why not for you?

In-plant training conducted by Mobil specialists demonstrates proper lubricant application and maintenance procedures . . . teaches Fairbanks, Morse personnel to recognize and prevent trouble before it results in downtime, repair costs.



Disposal of thousands of gallons of water-soluble cutting oils posed serious, expensive problem. Mobil recommendation of chemical separation process allowed disposal through plant sewage system . . . avoided stream pollution, saved substantial sum.

Control system cuts downtime:—Mobil lubrication charts cover plant's 2,300 machines . . . specify correct lubricants, lubrication periods . . . assure follow-through on application and maintenance.



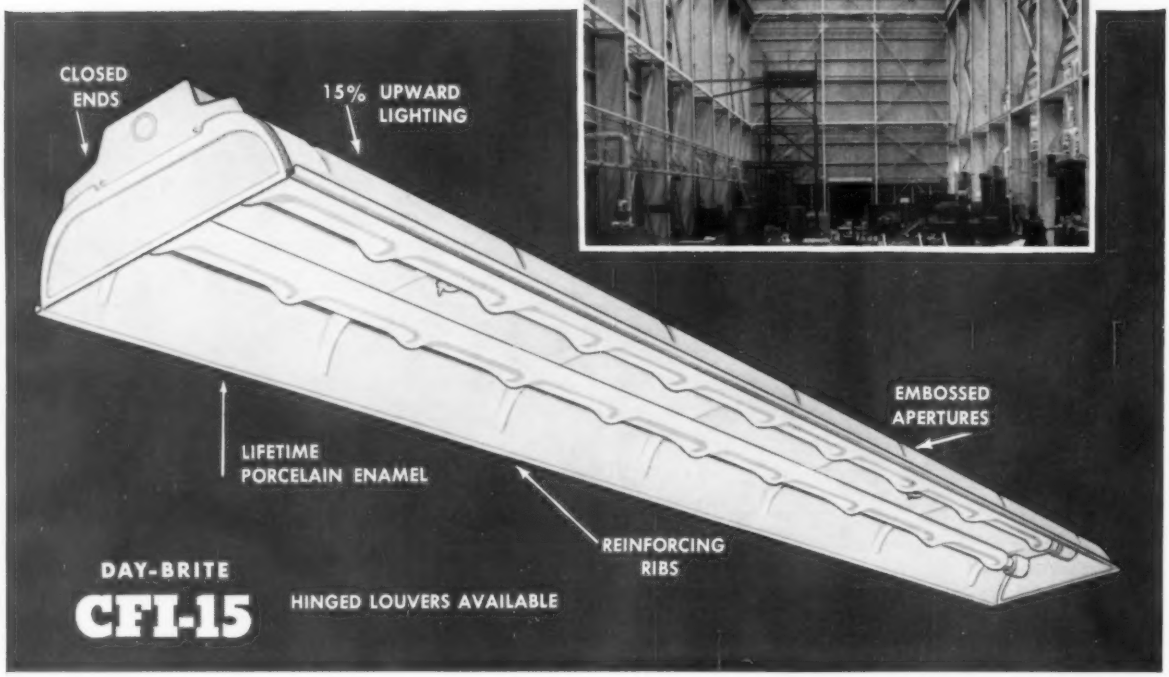
High temperatures of Boring Mill way lubricant lowered viscosity . . . resulted in pressure drop, causing machine to stop. Mobil recommendation solved problem, allowed continuous operation.

Correct Lubrication

Another reason You're Miles Ahead with Mobil!

How DAY-BRITE solves high-bay lighting problems with POWER-GROOVE

General Electric Co. Atomic Power Equipment Plant, San Jose, Calif. ROSENER ENGINEERING, INC., *Architect and Electrical Engineer*, San Francisco. ROY M. BUTCHER ELECTRIC CO., *Electrical Contractor*, San Jose.



CFI means **C**omfort **F**or **I**ndustry

THE PROBLEM facing engineers at the General Electric Co. Atomic Power Equipment Plant at San Jose, Calif. was to provide a minimum level of 50 foot-candles of glare-free, shadowless lighting over 11,800 sq. feet of floor space. *And lighting fixtures could be mounted no lower than 64 feet above the floor.*

SOLUTION: Installation of 108 Day-Brite CFI-15 two-lamp fixtures for 8-foot Power-Groove lamps.

RESULTS (from engineers' report): Illumination at the work level of 66 foot-candles on horizontal plane, without visible shadows. Brightness ratio between fixtures and ceiling within acceptable limits. No objectionable glare.

Day-Brite CFI (Comfort for Industry) Power-Groove industrial fixtures are available now in four new units: CFI-15, CFI-20, CFI-30 and CFI-30L (with louvers). Find out how they can work for *you*. Call your Day-Brite representative listed in the Yellow Pages!

DECIDEDLY BETTER
DAY-BRITE
Lighting Fixtures

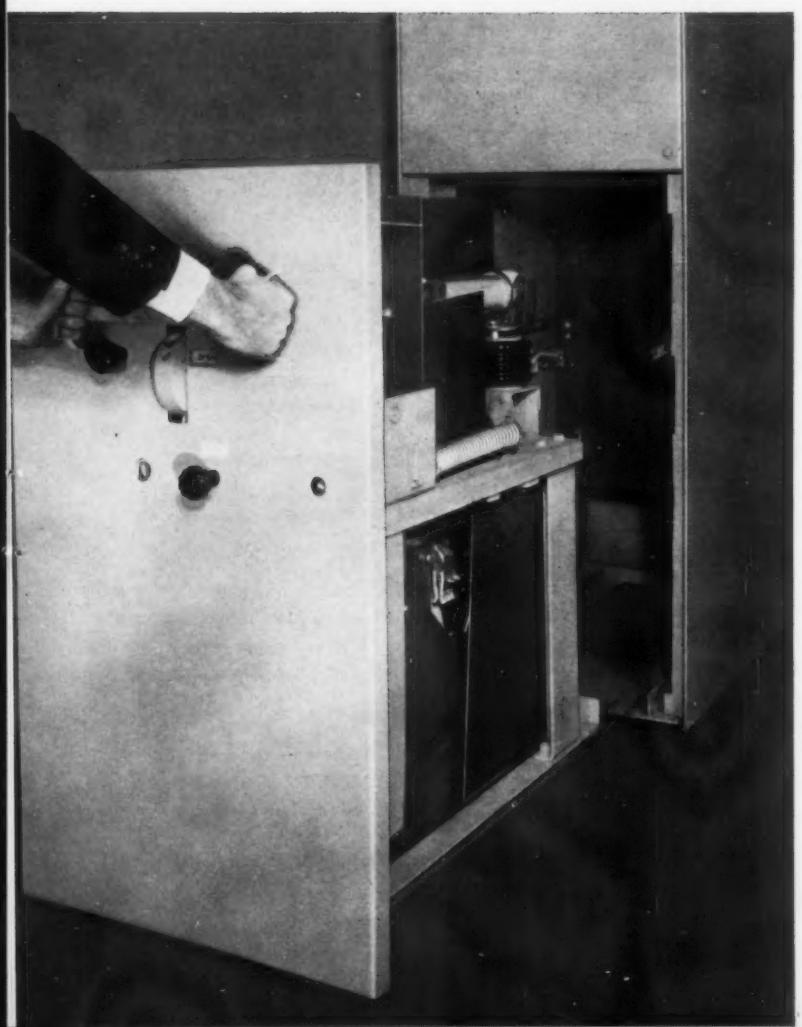
Z-77

Day-Brite Lighting, Inc., 6242 N. Broadway, St. Louis 15, Missouri • Day-Brite Lighting, Inc., of Calif., 530 Martin Ave., Santa Clara, California

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

For more facts circle 551 on Reply Card

Simple maintenance, inspection with General Electric ROLLOUT Switch and Fuse Equipment



It's new—General Electric Rollout Switch and Fuse Equipment. It rolls out like a file cabinet drawer—allows simple, fast inspection and maintenance. Plus—improved protection, greater safety, and installation flexibility.

For more information on this new Rollout Switch and Fuse Equipment call your nearest General Electric Apparatus Sales Office or write for bulletin GEA-6623, General Electric Company, Schenectady, New York.

514-2

Progress Is Our Most Important Product

GENERAL ELECTRIC

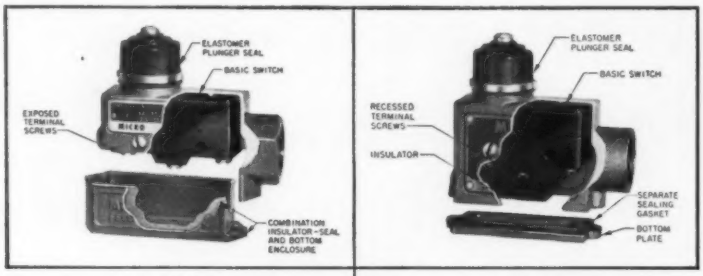
NEW ROLLOUT SWITCH AND FUSE EQUIPMENT, in ratings from 2.4 kv to 13.8 kv, is applicable for both normal switching and fault current protection.

For more facts circle 552 on Reply Card

MICRO SWITCH Precision Switches

NEW! . . . A new housing for the widely used "E" and "V" series provides Easier Installation . . . a Better Seal . . . and Better Insulation

View shown: side mounting; also available with bottom mounting and five different actuator designs.



NEW OLD

Compare these two cut-away views. Note how terminal screws in the new "E6" Series project from the bottom of the top portion of the housing; how the insulator and seal are one moulded neoprene piece, cemented into the bottom part of the housing.

This new housing replaces the one formerly used in the "E" and "V" Series and is known as the "E6" and "V6" Series. The new series is interchangeable with the old series.

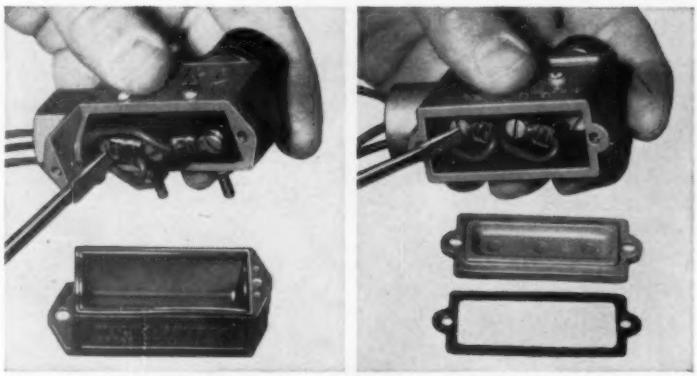
The new "E6" and "V6" have these outstanding advantages:

Easier Installation. Terminal screws now project from top portion of housing instead of being recessed in a cavity, thereby making easier installation.

Improved Insulation. A one-piece moulded neoprene insulator-seal, cemented into lower portion of housing replaces the separate, wrap-around Fiberglas insulator and separate gasket.

Rugged–Heavier Walls. The new, two piece housing has heavier walls—a hex-shaped conduit hub instead of round. A much cleaner, stronger design.

Interchangeable with old series. Dimensionally the same as old series—same mounting holes, same width, height and depth. Compact—fewer parts.



NEW OLD

The new series design can be installed in jig-time. No deep cavity in which to fumble with a screw-driver, no fold-in insulator, no jiggling with a separate sealing gasket.

For complete details of this new series write for Data Sheet No. 145.

The two word name "MICRO SWITCH" is NOT a generic term. It is the name of a division of Minneapolis-Honeywell Regulator Company.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

First in Precision Switching

For more facts circle 553 on Reply Card

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Implied Warranties

CONTRACT WAS made for the sale of a rotary kiln and equipment. In that contract it was stipulated that, "The company will repair f.o.b. works where made or furnish without charge a similar part to replace any material of its own manufacture which within one year after shipment is proven to be defective when shipped, provided the purchaser gives the company immediate notice in writing of such defect.

"No other warranty express or implied, concerning the subject matter of this contract shall bind the company without its written consent, duly executed by one of its executive officers."

Later when suit was brought against the purchaser to recover the price agreed upon in the contract, counterclaims were set up as a defense, for breach of both implied and express warranties irrespective of this disclaimer in the contract.

The court said, "Where the written warranty specifically excludes all other obligations, express or implied, recovery is restricted to the express warranty and is barred on any warranty by implication." Court brief 70 Atl. 2d 9, Delaware.

Restrictions on Employment

AGREEMENTS BY A manufacturer of electrical condensers with approximately 8,000 of its employees contained a provision that the employee assign to the employer any and all inventions and discoveries he might make. The provision was as follows, "He will not at any time during said employment disclose to any one any information that he may acquire during said employment relating to any of the processes, formulae, plans, circuits, devices or methods developed, acquired, manufactured or practiced at any time by said corporation in its business and he will not use any of said processes, formulae, plans, circuits, devices or methods, or his knowledge of the same except in the course of his employment by the corporation."

In a refusal to enforce an employment contract containing provisions of this character, a federal court asserted that such a contract goes beyond the protection of trade secrets and embraces anything the employee saw or learned during his employment.

"The law is settled," said the court, "that a contract in restraint of labor which seeks to prevent one of the contracting parties from exercising his skill or labor generally without limitation as to place or time, or which attempts to put a restraint upon his right to labor or to exercise his skill greater than is necessary for the fair protection of either party to the contract, is void." Court brief 62 F. S. 1, Delaware.

Loss of Trade-Mark

UPON THE expiration of the patent, a competitor used drawings filed by the manufacturer with the patent office in his application for the patent, for the advertising of a similar article.

Suit was brought by the patentee in which trade-mark infringement was claimed. In its decision, judgment was granted in favor of the alleged infringer and on appeal that judgment was affirmed.

Of such circumstances it was said, "Protection extends only to the time allowed by the statute for the patent and if the court were afterwards to protect the use of the word as a trade-mark it would be in effect extending the time for protection given by the statute. It is therefore impossible to allow a man who has once had the protection of a patent, to obtain further protection by using the name of his patent as a trademark." Court brief 199 Fed. 412, Missouri.

Unpatented Invention

HAVING DISCOVERED a method for the improvement of dial telephones, drawings and models were submitted by the inventor to a telephone company. Under his agreement the inventor was to be employed by the company should the invention be accepted. Several months later the offer was rejected and the material returned to the inventor.

However, according to the inventor, his discovery had been appropriated and used by the telephone company. Although no patents had been issued, he nevertheless sued for an injunction and damages.

In denying an application of the telephone company for a dismissal of this suit on the grounds that the circumstances did not entitle the inventor to the relief he sought, the New York court said of the law governing circumstances of this character. "When an idea is published without the protection of patent or copyright or the product is sold in the open market, anyone who has the ingenuity to utilize the idea may make free use of it and is not accountable to the inventor.

"On the other hand," asserted that court, "when the idea is entrusted by the inventor to another either in confidence or under an agreement, as in this instance, its disclosure may be held a breach of trust. In such instances if a profitable use is made of it, there may be required from the wrong doer an accounting and damages for such an invasion of the inventor's property rights." Court brief 117 N.Y.S. 2d 294, New York.

Contract Interference

AFTER A CONTRACTING company had defaulted on its contract for the construction of a steam generator, the surety, in completing the contract, advertised for bids. To the low bidder the agent of the surety said, "It is your job." On the following day however a lower bid was received and its acceptance was recommended by the surety.

Suit was brought by the disappointed contractor against the surety for its interference with his anticipated contract. Of the law governing wrongful interference with the contract of another, reference was made by the court to a similar case in which it had been said that an action can be brought for damages against another for interference with an executory contract. The question

COURT DECISIONS

is whether this rule of law extends to one who without a lawful excuse prevented another from entering into or making a contract.

In its application of this rule to the circumstances surrounding the construction of this steam generator and the suit for damages against this surety company, the court emphasized one outstanding exception to the rule, "that this liability does not extend to one who has a financial interest and his conduct is motivated by that interest. Under such circumstances he cannot be said to be an intruder." Court brief 242 Fed. 2d 76, Virginia.

Sales on Approval

ORDER FOR A gasoline engine was given a manufacturer by the tenant of property in Iowa. One half of the purchase price was payable in cash and the balance by two promissory notes secured by a chattel mortgage on the engine. These payments were to be made, "When the engine is set up, running and meeting your claims." It was further provided that title to the engine should not pass to the purchaser until the notes had been paid.

When the engine was delivered, a representative of the manufacturer put it into satisfactory operation and received the notes as agreed. Claim was later made by the landlord, when a foreclosure action was brought by the seller of the engine, that the landlord held a lien for rent unpaid by the purchaser.

"This order for the engine," the court asserted, "was not a purchase but merely an agreement for purchase upon terms and conditions. The first being that the seller was to put the machine into satisfactory operation.

"Property does not pass absolutely until the sale is completed and it is not completed until the happening of any event expressly provided for or so long as anything remains to be done to the thing sold to put it into a condition for sale or to identify it."

In denying the existence of any lien of the landlord for rent, the court added, "This was a sale on approval after a condition performed by the seller and did not become complete until such approval by the buyer, although he was given custody of the subject of the contract before that time." Court brief 88 N.W. 948, Iowa.

Cancellation Waived

IN KENTUCKY a farmer bought a threshing machine on which two payments were to be made after delivery. In its agreement the manufacturer warranted that the machine was well built, of good material and when properly operated would perform as well as any other machine of like size and capacity.

In this contract, however, the purchaser had stipulated that if the machine did not fulfill these promises or warranties that he would give notice in writing within five days from the first time the machine was used.

When the first of these two payments became due the farmer ignored it, continued to use the machine throughout the entire season and then asserted that it had failed to fulfill the promises of the manufacturer.

In granting the manufacturer a recovery of the unpaid balance, the court said that the purchaser had failed to understand his rights. "Even though the contract was silent on the subject, a buyer who seeks to avoid an agreement he has made, must take action promptly after discovering the defects, in addition to restoring or offering to restore the property. Otherwise he has merely the right to recover the difference between the value the machine should have possessed and what it was actually worth." Court brief 162 S.W. 2d 190, Kentucky.

Consequential Damages

CONTRACT FOR the sale of refrigeration equipment contained in large print a disclaimer of all warranties express or implied other than title and freedom from defects in workmanship or material, for one year, with the clause that the manufacturer assumes no liability for consequential damage of any kind, relating to this equipment.

After the installation work had been completed, coils of three air handling units were found incorrectly circuited. Corrections were made. This was followed by a suit against the manufacturer not only for reimbursement for the cost of recircuiting these units but additional and consequential damages in excess of $10,000 for loss and collateral expenses.

"Other than the time for recircuiting," asserted the court, "all the items enumerated as charges against the seller represent here consequential damages within the exemptions of this clause and in no way chargeable to the seller." Court brief 145 F.S. 699, California.

Design Patent Refused

SUIT WAS BROUGHT a few months ago against the Commissioner of Patents to compel the issuance of a design patent on a series of refrigerating coils suspended vertically from circular pipes located in a horizontal position. These coils, known as a heat exchanger, were enclosed in a concealed casing.

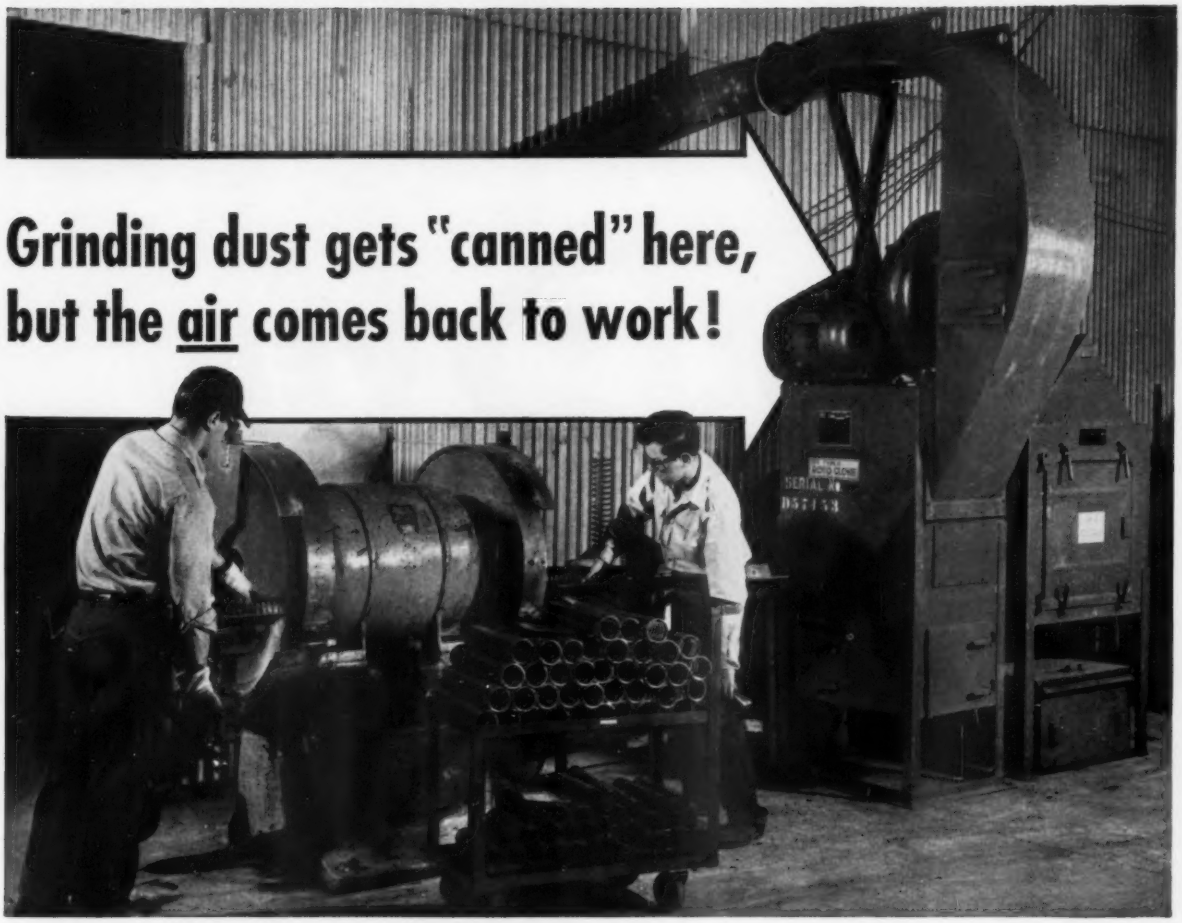
By the Commissioner of Patents this design patent application was denied on the ground that the invention used in a closed vessel lacked the feature of patentable ornamentation necessary for such a patent.

In sustaining the Commissioner of Patents in the refusal to grant this patent, the court referred to the determination of an earlier controversy of this character. There it had been held that a design patent could not be granted on a rotary brush, an elongated cylinder with two rows of brush tufts.

"Almost every article is visible when it is made," the court said, "and while it is being applied to the position in which it is to be used. Special circumstances do not justify the granting of a design patent on an article such as here under consideration, which is always concealed in its normal and intended use.

"The ornamental appearance of such an article," continued the court, "is a matter of such little concern that it cannot be said to possess patentability as a design.

Thus, resting its denial of this application on that authority, the Federal court said, in conclusion, "It has been held repeatedly that articles which are concealed or obscured in normal use are not proper subjects for design patents since their appearance cannot be a matter of concern." Court brief 147 F. S. 511, January 23, 1957.



Grinding dust gets "canned" here, but the air comes back to work!

AAF ROTO-CLONE-Cycoil team saves money for Duer Spring Co.

AAF's team of Type D ROTO-CLONE and P-17 Cycoil is the ultimate in metallic grinding dust control. Duer Spring Company, McKees Rock, Pennsylvania, is an example. Here's what these units are doing for them: (1) eliminating *all* spring grinding dust, (2) saving on fuel bills by returning cleaned air to the workroom, (3) lowering maintenance costs by preventing oxidation to building.

The Type D ROTO-CLONE gets the first shot at the grinding dust and removes all but the very small particles. The dust that does get through this rugged dry collector is trapped by the high-efficiency P-17 Cycoil Oil Bath After-cleaner. The dust-free air exhausted by the Cycoil is returned to the workroom.

Make sure you get all the advantages of modern dust control methods. Call your local AAF representative or write direct for Type D ROTO-CLONE Bulletin 272A and P-17 Cycoil Bulletin 285A. Address: Mr. Robert Moore, American Air Filter Co., Inc., Louisville, Ky.

AAF herman nelson

American Air Filter
COMPANY, INC.
228 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Air Filters and Precipitators

Illinois Heating Specialties

BETTER AIR IS OUR BUSINESS

Herman Nelson Unit Heaters

Herman Nelson Portable Heaters

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THEY CHANGE THEIR OWN FILTERS-AUTOMATICALLY!

HERMAN NELSON

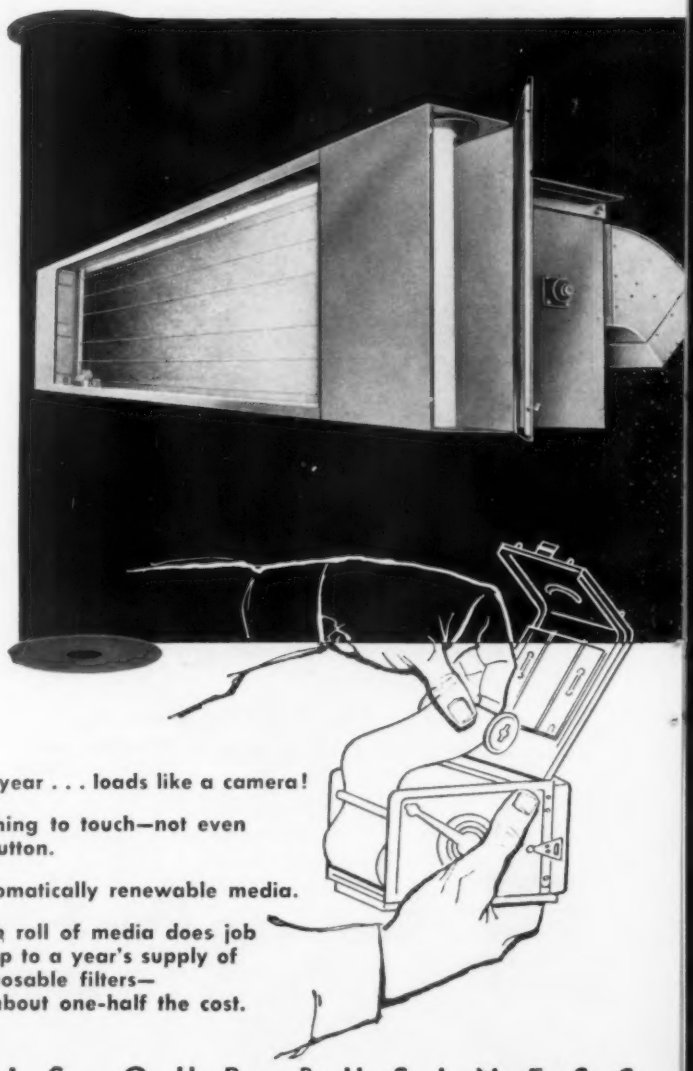
ROLL O VENT

AIR HANDLING UNITS

NEW, COMPLETELY AUTOMATIC IN OPERATION, the exclusive AAF Roll-O-Matic Air Filter Principle is now available on three leading Herman Nelson ROLL-O-VENT air handling units. You simply put the roll of media in the unit—*and forget it*—for up to a year! Operation is completely automatic, and under normal conditions costs just half that of ordinary disposable filters.

You gain maximum filtering efficiency *all year 'round*—with little or no maintenance. There is no reduction of efficiency in the system due to clogged filters. Furthermore, the system is always in balance—air flow *constant*—because clean media is automatically changed at just the right time!

Take advantage of the important time and cost-saving features provided by this exclusive AAF development. Write for full details on "packaged" Herman Nelson ROLL-O-VENT heating, ventilating and cooling units. Ask for fact-filled Bulletin 780. Address Dept. 228.



One roll of media lasts up to a year . . . loads like a camera!

- **Nothing to touch—not even a button.**
- **Automatically renewable media.**
- **Each roll of media does job of up to a year's supply of disposable filters—at about one-half the cost.**

BETTER AIR IS OUR BUSINESS

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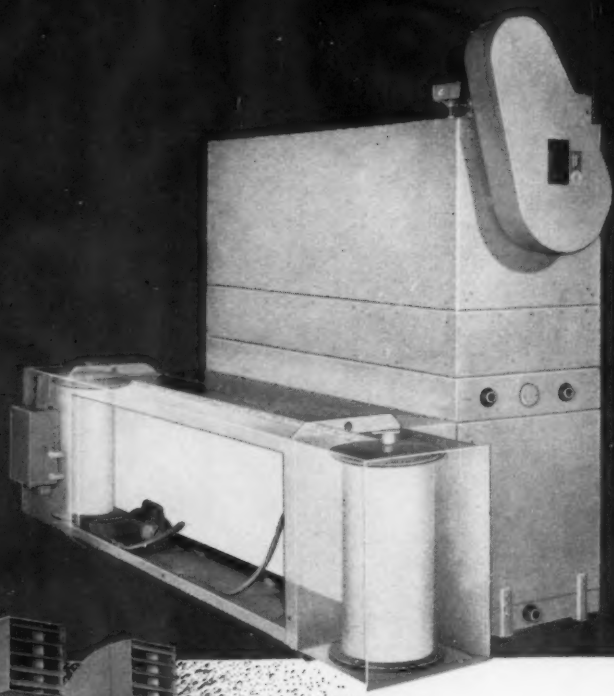

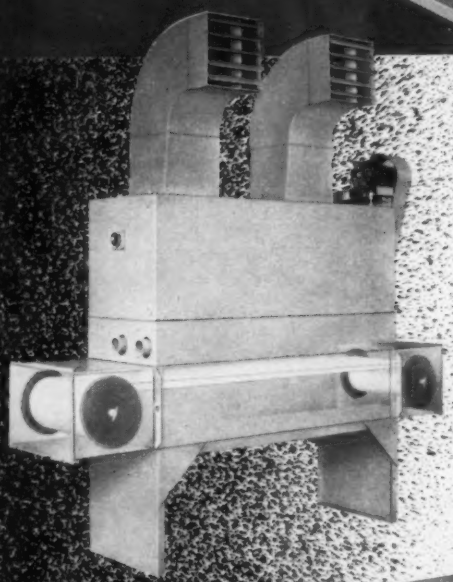

Herman Nelson
Roll-O-Vent
Air Conditioning Unit —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*

Herman Nelson
Roll-O-Vent
Industrial Unit Heater —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*

Herman Nelson
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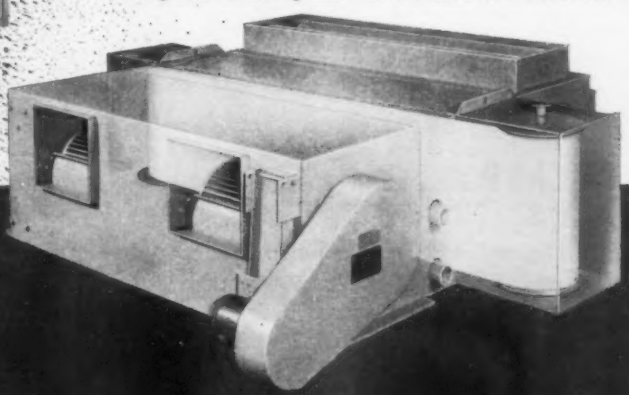
Heating And Ventilating Unit —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*



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The new Dravo *Counterflo* has performance built in . . . the kind of performance possible only in a heater in which every part has been designed and built to function as an integrated unit. But it is the skill with which this performance is applied to the solution of a specific heating problem that makes it completely effective.

This is the important "extra" that every Dravo Heater customer gets. *Every* Dravo technical representative *is a qualified heating engineer* skilled at solving all kinds of heating problems in all types of industrial and commercial buildings.

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Every man is backed by the home office staff, who can bring both laboratory facilities and the total experience of over 10,000 installations to bear on unusual problems.

Get the benefit of this Dravo "extra" when *you* have a heating problem.

difference

IN HEATER DESIGN

The new Dravo *Counterflo* heater, developed by an exhaustive research program, represents an important advance in warm air space heating. Its "unitized" design, making each part integrate smoothly with the functioning of the rest, and the fact that each part was designed specifically for its function, makes the new *Counterflo* unique.

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Here are some of the features which make the new *Counterflo* heater your best heating buy:

NEW PYROJET BURNER—exclusively Dravo—first burner developed specifically for direct-fired space heaters. Burns low cost oils efficiently. Switches from gas to light oil automatically.

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Bulletin 564 describes the many new features of the new Dravo Counterflo heater. Write or phone for your copy today. Address Dravo Corporation, Dravo Building, Pittsburgh 22, Pennsylvania.

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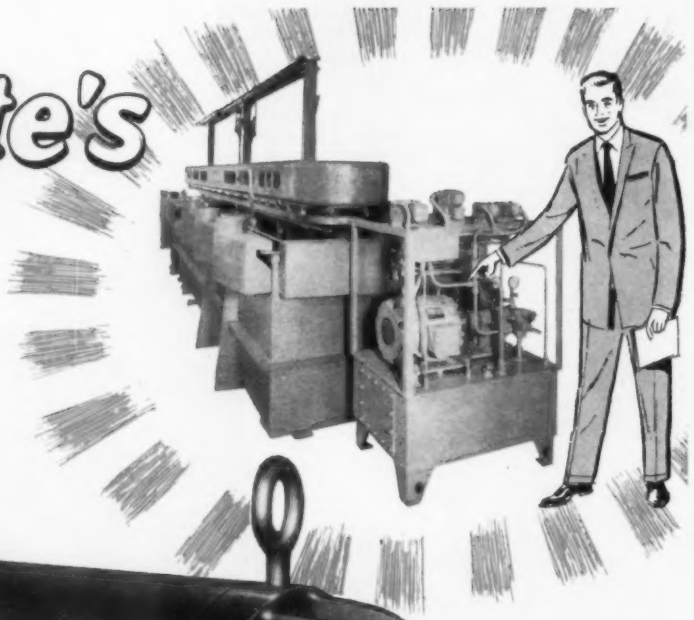

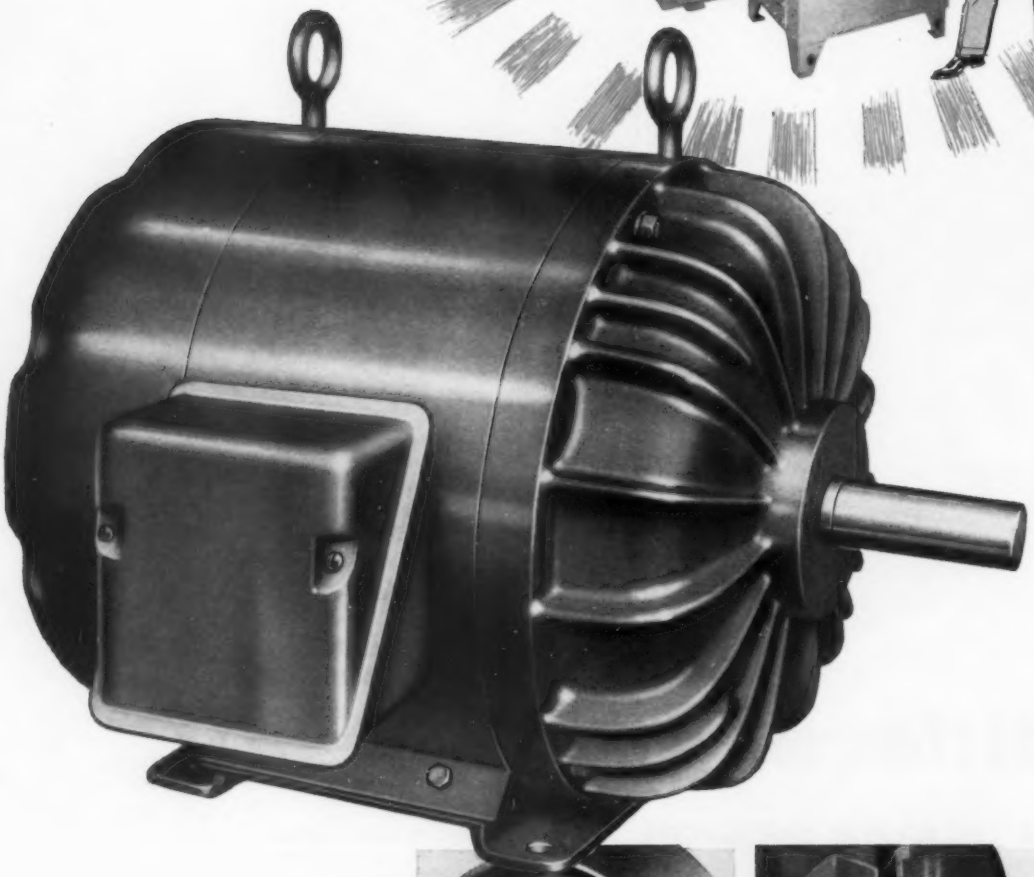

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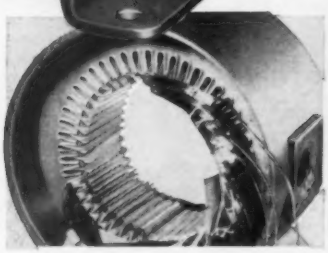

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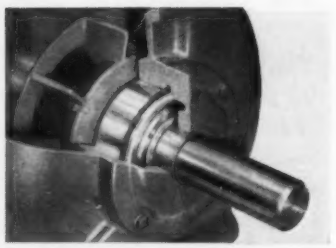

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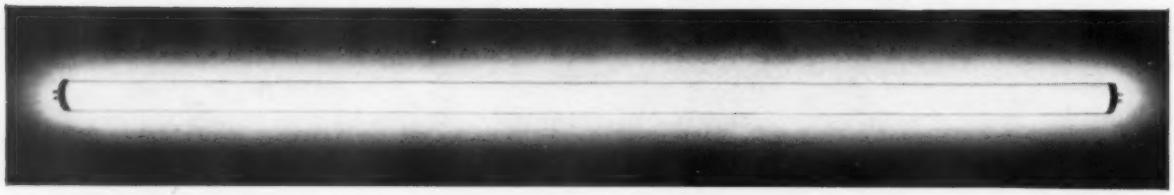

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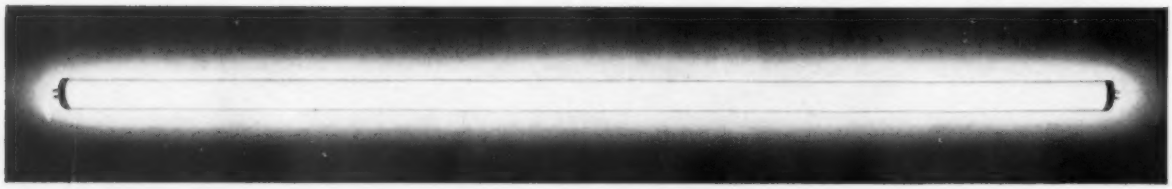

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"ULTRALUME"™ phosphors coat the inside of every Westinghouse fluorescent lamp and produce the light you see. "Ultralume" phosphors assure maximum brightness for the life of the lamp. Only Westinghouse has "Ultralume" phosphors.

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ALL Westinghouse fluorescent lamps have "Ultralume" phosphors . . . there's one for every industrial, business and home use. Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, N. J.

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THEY *get to take a last look inside*

Standard Oil research develops method for inspecting lubrication of enclosed parts without disassembling

What if you had to make a final inspection of enclosed parts to be sure they were lubricated and you could not do it without disassembling? Standard Oil research scientists have just developed an instrument system that determines lubricant level in an instant. The device measures the density of an assembly so precisely the presence or absence of the desired quantity of lubricant registers on a meter.

Having such a unit might permit you to shorten an assembly line or reorganize assembly operations for greater convenience, speed, economy. The research men at Standard who developed this inspection method will be glad to share their know-how with you to help you fit it to your assembly operations.

This is the research pay-out you get from Standard. This is the "something more" Standard gives to industry besides the research which has established Standard Oil petroleum products as the industry criteria for quality.

For more information about this development or for assistance on other lubrication problems, inquire of any of the 48 Standard Oil district offices in the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

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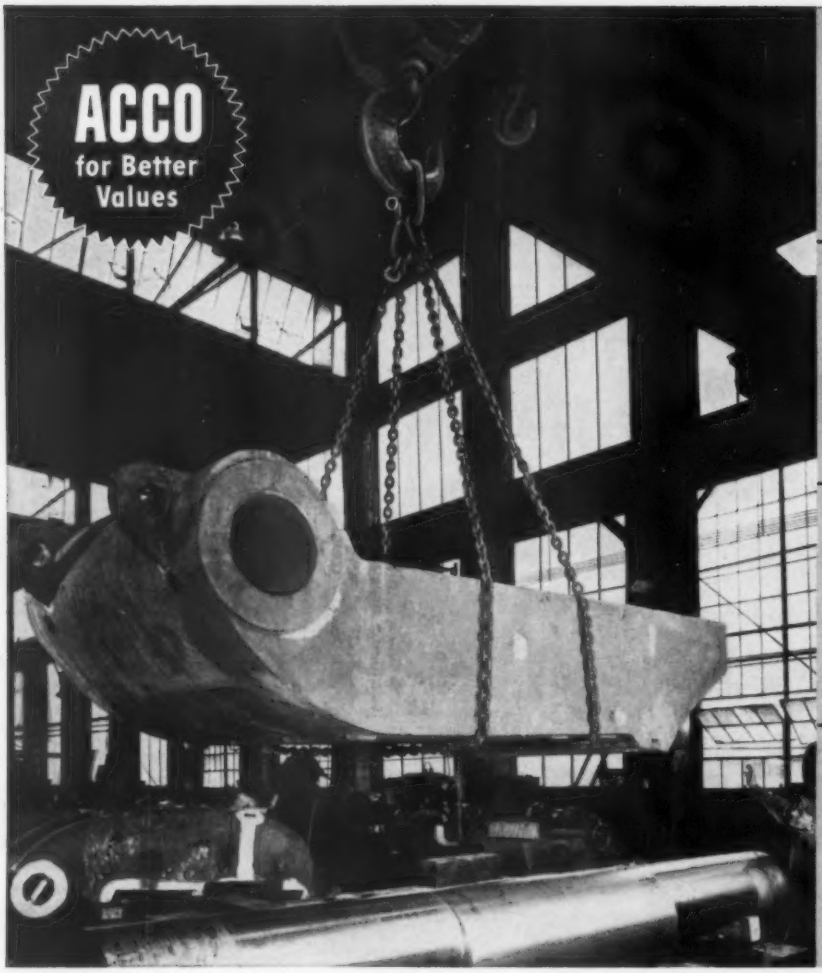

Big, costly loads are safe with Acco Registered® Sling Chains

• Pictured above is a huge, 35,000-pound casting being lifted *easily and safely* by a 4-leg ACCO *Registered* Sling Chain. Directly beneath the load is a highly polished and machined crank shaft worth many thousands of dollars.

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1 • **Accoloy X-weld 125 Chain**, for extra strength. This chain hangs straight . . . does not kink . . . has extra resistance to bending.

2 • **New Shaped Master Link**, uniquely shaped to withstand deformation under loads up to 18% greater than a round-section link can do.

3 • **ACCO Registration Ring**, serially numbered as evidence that the assembled sling has been factory proof-tested to twice its working load limit.

4 • **Registration Certificate**, signed by us, attesting to the field-tested design and proof-testing of the complete sling.

Remember, the best sling is one of your most economical material-handling tools. You'll find it good business to consult your ACCO *Registered* Sling Chain Distributor on all your sling needs; his counsel is available without obligation. If you don't know his name, write us at York, Pa.

WHAT "ACCO REGISTERED" MEANS

1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling

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Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

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WRIGHT HOISTS & CRANES

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FOR LONGER LIFE • EASIER MAINTENANCE
LOWEST FINAL COST

WRIGHT *SPEEDWAYS*

Available with single, 2-speed or variable speeds and with a wide variety of mounting arrangements

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Capacity ¼-ton to 1 ton. Two-speed, 1800/450 RPM motors permit precise, gentle positioning of work at slow speed... fast lifting and lowering at high speed.

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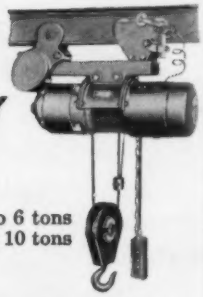


***SPEEDWAY* FRAME 2 FRAME 3**

Capacities—
Frame 2, ½-ton to 6 tons
Frame 3, 4 tons to 10 tons

NEW WRIGHT ELECTRIC CHAIN HOISTS

LIGHT—COMPACT—RUGGED—LOW COST

Two capacity ranges as pictured. Single Chain—300 to 2000 lbs. Double Chain—3000 to 4000 lbs.

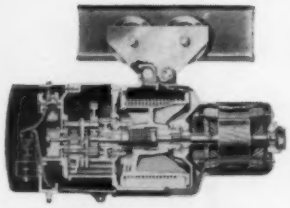
Long Life—Safety—Minimum Maintenance are assured by—

Alloy Steel Load Chain wick-oiled for longest life...heat-treated for long-wearing surface and ductile shock-resistant core—**Load Wheel, Hooks** and **Hook Couplings** drop-forged alloy steel—**Precision Ball Bearings** and **Gears** operate in oil bath—**Double Braking—Fewest Moving Parts.**

These Features make WRIGHT *SPEEDWAYS*

Capacities ¼-ton to 10 tons

your best buy for— MORE PRODUCTION



Fine balance and heavy-duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30 minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core is shock resistant to severe service stresses. Anti-friction bearings throughout.

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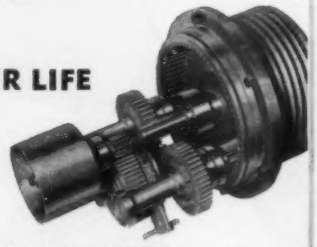
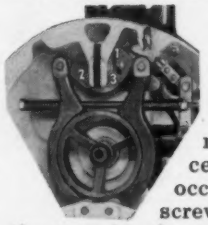


Strength of gear teeth of WRIGHT Frame 2 and Frame 3 *Speedway* Hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flange cross section is bolted to drum at six points and provides extreme resistance to distortion.

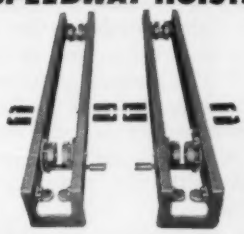
EASIER MAINTENANCE



There is "*Nothing to Adjust but the Cam*" to keep the motor brake in perfect adjustment. When excessive load drift occurs...remove the screw shown at Position **1**, swing the cam until Position **2** is in line and replace the screw. Position **3** is provided for the final one-third of brake lining wear. Brake springs and solenoid never need adjustment!

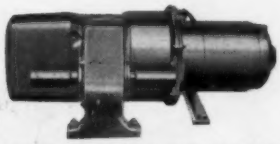
Build Better Cranes Save Money too! with WRIGHT

END TRUCKS
CRANE DRIVE UNITS
***SPEEDWAY* HOISTS**



WRIGHT END TRUCKS

For motor-driven cranes and hand traveling cranes—both top-running and under-hung types. Timken Bearings throughout. Wide range of capacities up to 10 tons. Structural steel construction is lighter and stronger than cast frames.



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For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well-proportioned gear reduction. Units are equipped with WRIGHT-designed solenoid "drag" brake. Size 1 Drive Unit has motors up to 2 HP...Size 2 has motors 3 HP to 7½ HP.

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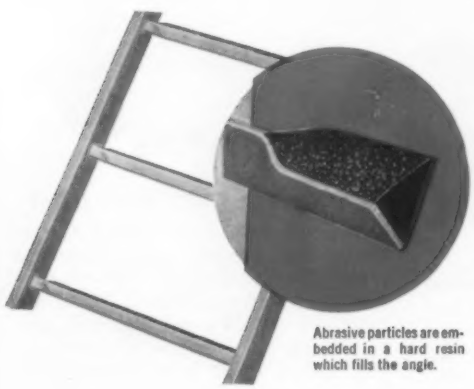
NOW Relgrit®

ABRASIVE EMBEDDED LADDER RUNGS

Reliance now offers ladder rungs with the same non-skid Relgrit surface which has eliminated accidents on gratings and treads wherever it was used. The abrasive particles of aluminum oxide are embedded in a hard resin, and even when wet or greasy they give safe, sure footing. Relgrit is not affected by common industrial chemicals, and will last as long as the steel in the ladder.

Rungs are available for all kinds of ladders for new construction; and replacement types include one which can be placed over existing rungs. Complete ladders can be made to order, in either aluminum or steel. For information, write or consult your Reliance representative.



Abrasive particles are embedded in a hard resin which fills the angle.

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P.O. Box 510-P, McKeesport (Pittsburgh District), Pa.

Relgrit Abrasive Gratings and Treads • Lightweight Bridge Flooring
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Please send Bulletin RSL-1 describing Relgrit abrasive embedded ladder rungs.

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What's Just Ahead in This Issue?

HONEYCOMB material, sandwiched between aluminum plates, may be your answer to the problem of providing light-weight, slip-resistant work platforms for both maintenance and production personnel. To see how these platforms are made and used in one plant, turn to page 101.

IS high-bay lighting a problem in your plant? Here is a neat solution all worked out for you, with information on how many fixtures to use and where to put them. You can learn how to duplicate this installation in your plant by turning to page 107.

SPECIAL lubrication systems are constantly in demand because of the fast speeds and intricate operations of industrial machines. One such system, applying lubricant in an aerosol-like spray, is helping a number of plants keep their equipment operating at top speed. Can this method of lubrication help you? See the article on page 116.

WHEN selecting pressure regulators for your plant, do you know what inner valve characterization you really need? Is convenience or accessibility of location a determining factor in your choice? These and ten other points that might affect or alter your choice of a pressure regulator will be found in the article starting on page 109.

RECTIFIERS are fast becoming a leading source of d-c power in industrial plants. The article "Primer on Rectifiers," presented in this issue, page 94, will help you better understand how they work. You'll find out how the cells are connected in series and parallel to obtain various voltage and current ratings. Maintenance tips and circuit diagrams are also illustrated.

SQUEEZING a lot of equipment into limited space can be a ticklish job. General Electric's plant engineer at the Morrison, Illinois plant, made the most of the space he had by careful selection and placement of materials handling equipment to serve the machines. To see how he did it, turn to page 124.

WHAT can you generally expect from different types of metering equipment? How do you decide which is the proper meter for a particular flow? The article, beginning on page 119, presents a briefing on different ways to meter; particular attention has been given to the theory of operation of a magnetic flow meter. A number of questions are included which will aid you in selecting the right meter.

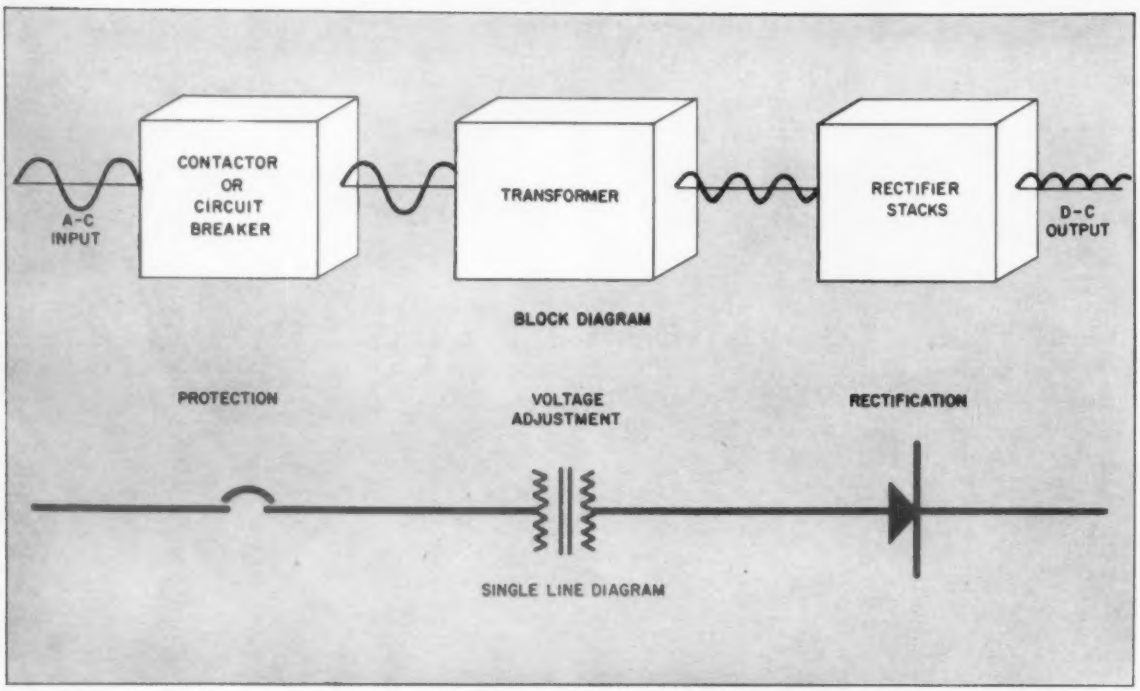


Fig. 1. Most rectifiers use three basic parts to provide protection, voltage adjustment and conversion to d-c current

Primer on Rectifiers—

Circuits, Applications, Troubleshooting and Maintenance

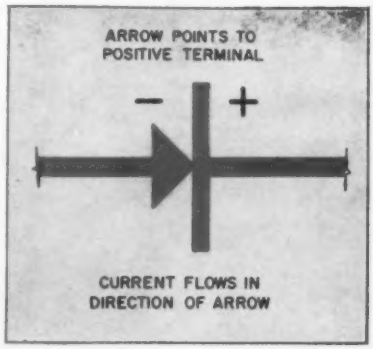
By TOM WHITE, Chief Engineer, Ther Electric and Machine Works, Chicago, Ill.

SELENIUM RECTIFIERS are relatively simple, reliable electrical devices and can be maintained and serviced without a complete understanding of their operation. Ninety per cent of rectifiers in industrial plants supply 115 v or 230 v for d-c equipment such as elevators, mills or cranes. They have three basic parts as shown in Fig. 1.

The contactor or circuit breaker serves a dual purpose. It is used as a switch to energize the unit and also serves as protection. The protection is accomplished in the circuit breaker by means of its internal current operated trip coils or in the contactor by thermal overload relays. Thermostats, in the air stream from the stacks, are used to disconnect the power in the event of overheating due to high ambient temperature, overload or defective parts.

Transformers are used to change the line voltage to the required voltage into the stacks to obtain the desired output voltage. The input voltage depends upon the design and losses of the individual rectifier.

Fig. 2. Rectifier symbol indicates the direction of current flow and polarity



The stacks take this alternating output voltage from the transformer and switch it in one direction in the d-c output. It can be thought of as a switch, which opens when it is desired to block the flow of current and closes when that line should pass current to the load. There are always some contacts open, or stacks blocking while others are closed or stacks conducting.

The maintenance of rectifiers is very simple and similar to other electrical equipment. The most important thing to remember is that a rectifier obeys all the normal laws of

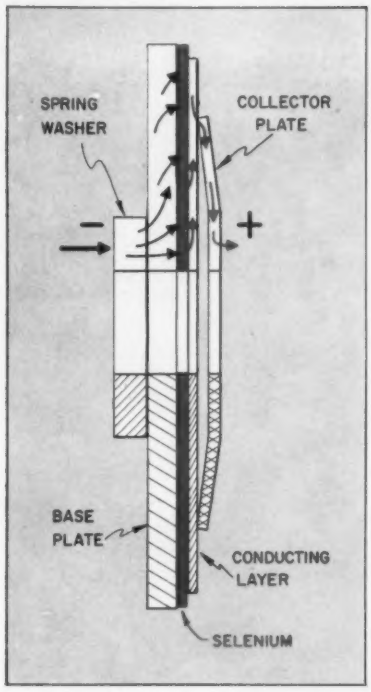


Fig. 3. Current flow through rectifier

electricity and the components do not perform or test any differently in a rectifier than in any other application.

Approximately 75 per cent of the trouble calls and neglected maintenance in rectifiers are in standard parts such as switches, circuit breakers, thermostats and transformers. If these same parts had been installed in a motor or lighting circuit, their trouble would have been located by the maintenance man with little difficulty. Installing a transformer or a contactor in a cabinet with a rectifier does not change them in any way and they must be tested and serviced exactly the same as out of the rectifier.

To service a faulty rectifier, the first step is to localize the trouble to one of the main parts. An a-c voltmeter should be used to check all three phases of the input to the contactor or circuit breaker, the input to the transformer and then to the stacks. The first two sets of readings will be the line voltage and should be equal. The output voltage from the transformer should be equal across each of the three phases and will depend upon the design of the rectifier. If the readings are unequal at any point trouble is indicated in the preceding part.

It is normal for the output voltage of a rectifier to drop as the load is applied. This is also true of the transformer and the incoming line. In a new rectifier, this may vary from 20 per cent to a low of 5 per cent of the full load voltage.

At light loads, there is very little voltage loss in the parts and a high per cent of the a-c voltage passes through into d-c voltage. As the load increases, the losses and voltage drop increases and less is passed through. This is the reason for regulation.

As selenium stacks are used, their losses and forward voltage drop increase and the d-c output decreases. At no load, the drop remains small so there is a greater difference between no load and full load voltage. This increases the regulation of the unit.

In a well designed rectifier, transformer taps are supplied to increase the a-c voltage to the stacks to compensate for the increased drop. The same taps should be used in all phases to keep the a-c voltage balanced. This restores the d-c output to its original value but raises the no load voltage. The regulation, or difference between no load and full load voltage, remains the same as before the transformer tap change.

Many years of additional service can be obtained from a rectifier if it is transferred from a heavily loaded application where the d-c equipment is very sensitive to low voltage and put in a job where it is lightly loaded by equipment relatively insensitive to low voltages.

A good indication of approaching breakdown is the temperature rise of the stacks. If the temperature climbs to or passes 167 F you are heading for trouble.

In case of trouble, take a reading at light load and one at full load. If the voltage input remains relatively constant while the output changes radically, the trouble is in the part under test. As an example, poor contact in a circuit breaker could cause this change.

When the trouble is traced to the stacks, the next problem is to test the individual cells. The first method is usually a visual inspection. Any signs of melted metal similar to solder or large burned spots in the coating on the plates would be evidence of failure. Such failures are usually the result of extreme overload or overvoltage. These indications are not completely reliable and it is best to make an electrical check.

Fundamentals of Basic Rectifier Circuits

UNDERSTANDING BASIC rectifier circuits will speed up these electrical tests. Let us briefly review some of the fundamental principles of rectifier operations.

It is well to fix in your mind the meaning of the rectifier symbol. It might be convenient to think of it as an arrow, Fig. 2. This arrow shows the direction of current flow and also points to the positive terminal of the rectifier. With these facts in mind it is easy to trace any rectifier circuit.

Individual selenium cells, Fig. 3, consist of a steel or aluminum plate, electroplated and coated with selenium on one side. A conduction layer of low melting point metal similar to solder is sprayed over the selenium. This is masked from the edge of the plate.

If the conduction layer came right out to the edge of the plate, the full voltage, which instantaneously reaches 36 volts, would appear across the edge of the plate separated by less than 0.001 in. With the conduction layer masked back about ⅛ in., the creepage distance is much greater since the resistance of selenium is comparatively high in the direction of the plate.

The actual rectification takes place between the junction of the selenium and the conduction layer. The current enters the center of the plate, separates and flows out toward the edges. It passes equally through all parts of the selenium area into the conducting layer, is accumulated in the center of the plate and leaves the plate at this point.

Application of selenium cells is very similar to conventional dry cell batteries. They can be connected in series for higher voltages, Fig. 4, or parallel to obtain increased current capacities, Fig. 5. Combinations of series and parallel circuits are used

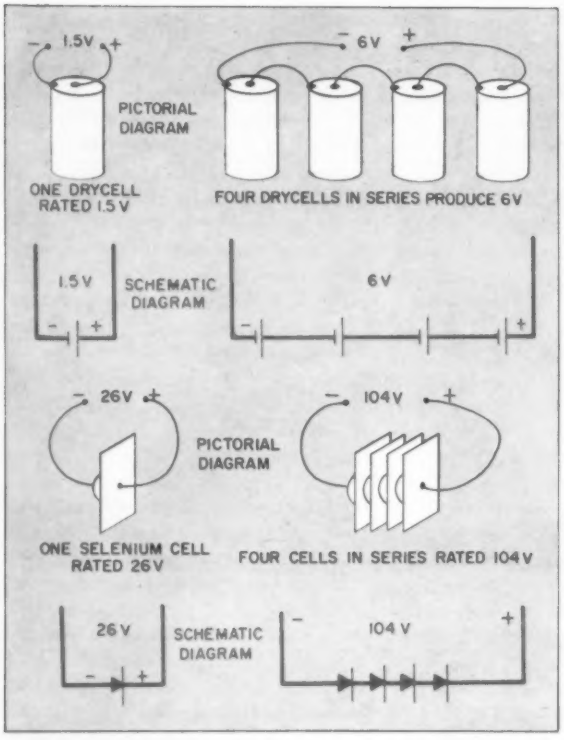


Fig. 4. Cells connected in series increases the voltage rating

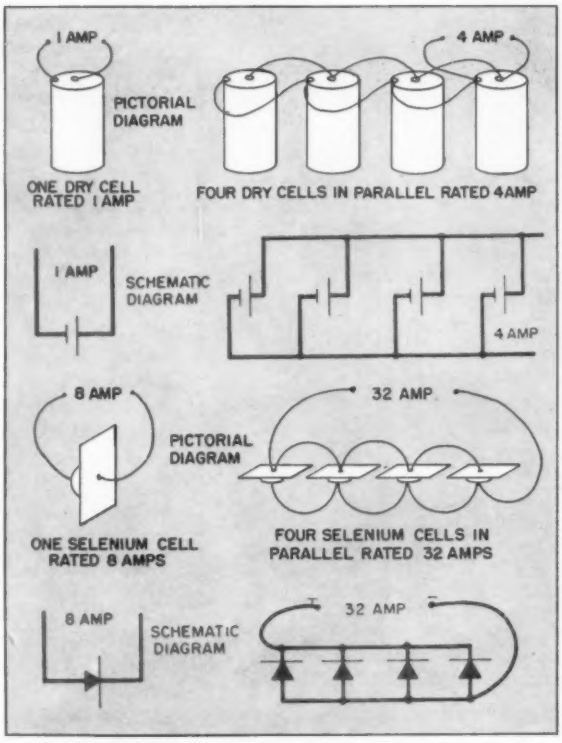


Fig. 5. Parallel connection of cells increases current rating

to obtain desired voltage and current ratings, Fig. 6.

Visual inspection of a plate will not indicate its voltage rating. Plates are generally made with ratings from 18-v to 40-v root mean square (rms). Most cells are in the 24-v to 26-v range. The current rating of a cell is related to its area. While all manufacturers do not rate a given size plate at the same capacity, standards have been established which can be used to determine conservative ratings.

Circuitry changes the available output from a given cell. Let us consider the single phase center tapped circuit with two plates measuring five inches by six inches, Fig. 7. If 26 volts were developed in the secondary of the transformer, about 9.5 volts would appear across the d-c load. The circuit will deliver about 9.4 amperes.

During each half cycle, one plate is conducting and the load is connected across its half of the secondary. The other plate is connected across and blocking the entire secondary voltage. In the next half cycle, the conditions are reversed.

Bridge circuits use four plates and are more efficient. Four plates measuring five inches by six inches are connected in a single phase bridge circuit in Fig. 8. If 26 volts are developed in the transformer, about 19 volts appears across the load. When one cell or arm of the bridge conducts and connects the load to one end of the secondary, its diagonal partner connects the other side of the load to the other end of the secondary.

Twice the voltage appears across the load in the bridge circuit than in the center tapped circuit. The plates are required to block the full secondary voltage. The current that the plates can handle is the same as the first circuit. In effect we have doubled the number of plates and doubled the output voltage resulting in doubling the output wattage.

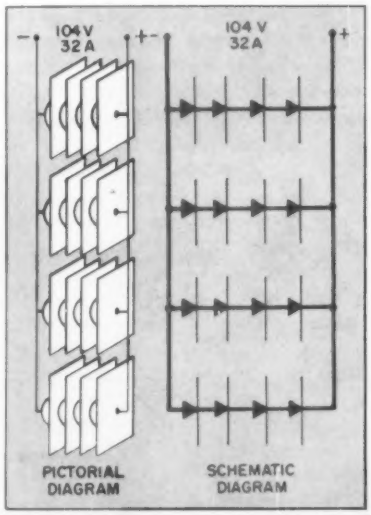


Fig. 6. Series-parallel connection of 26-v, 8-amp cell for 104-v, 32-amp output

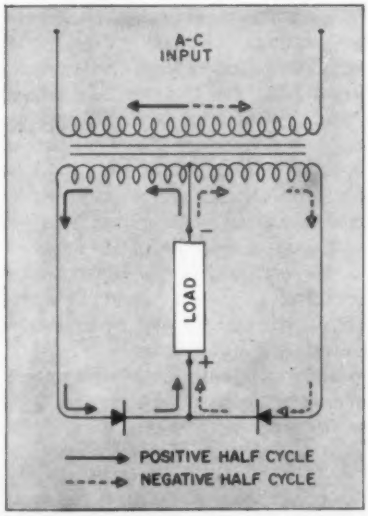


Fig. 7. Current flow in two cells connected in a single phase tapped circuit

Output voltages have been lower than input voltages in both of the previous examples. This is logical due to the losses in the plates. In the following examples, the output voltage may be higher.

Three voltages appear in the half wave, three phase circuit shown in Fig. 9. The voltage that appears in the output at any time is the voltage that is the highest positive at that instant. Even though two phases are positive and could push current through its stacks if it were alone, only one will do so.

The highest positive phase will pass current and try to force current back through the other phase and its stack because they are in parallel with it. At low positive voltages, therefore, a phase does not pass current. Each phase passes current and voltage to the load for one third of each cycle.

The load is alternately connected to the phase, or line to neutral voltage of the transformer. Plates are designed to block the line to line voltage when another plate is conducting. The output voltage of this circuit with a 26 volt input would be 15 volts. The three cells would carry 10.66 amperes.

In the three phase bridge circuit, Fig. 10, the opposite cells connect the load from line to line instead of line to neutral. This has two effects. The voltage is increased by the square root of three, 1.732 over the root mean square value and the maximum positive and negative voltages of a phase can pass current to a load. As in the single phase bridge circuit, both halves of the cycle are rectified.

This raises the voltage in another way. Now there are six voltages trying to supply voltage to the load. They divide and each conducts for one-sixth of the cycle. Each phase provides two of these voltages so it still conducts for one-third of each cycle. The important thing to remember is that now these two pulses are taken out of the sine wave when it is almost at its peak value.

This is the reason why the bridge circuit voltage is twice that of the half wave, and why the d-c output voltage is higher than the three phase a-c input. The three phase bridge circuit will deliver 30 volts to the d-c load with a 26-volt input. This circuit will deliver 12 amperes using the six cells.

Meet the Author

TOM WHITE has been with Ther Electric & Machine Works for over 20 years and now holds the position of Chief Engineer. During this period he designed the first large selenium d-c power supplies used in this country for operating d-c machinery. Mr. White holds a patent used quite extensively for electronically controlled regenerative power rectifiers. He obtained his formal education at Illinois Institute of Technology and during the war years was active in the Navy electronic and radar program.

Troubleshooting Rectifier Circuits

TROUBLESOME STACKS in a rectifier can be checked by several methods. The same general principles apply for all types of rectifiers. The simplest method is to check the stacks with normal a-c voltages applied. Let us consider this method first.

All terminals of the stacks go to either the a-c leads of the transformer or the d-c output leads. We call the part of a stack between an a-c

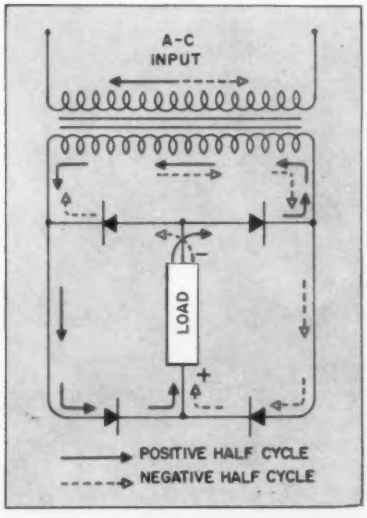


Fig. 8. Four cells arranged in a single phase bridge circuit doubles voltage

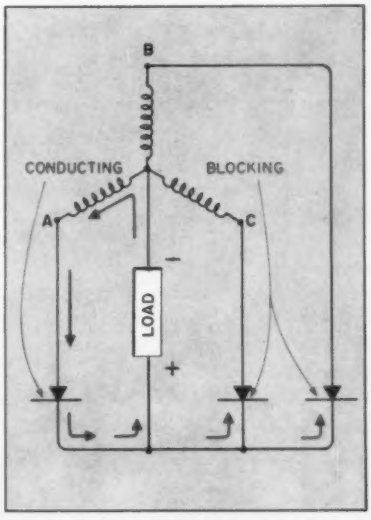


Fig. 9. Current flow through one phase of a three phase, half wave circuit

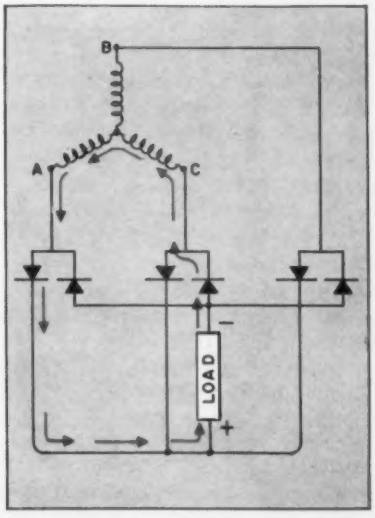


Fig. 10. Full wave, three phase bridge circuit uses the full line-to-line voltage

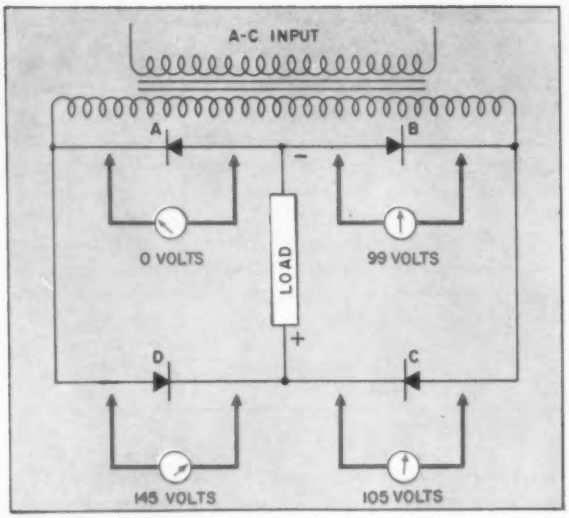


Fig. 11. Dynamic testing to locate defective rectifier stack

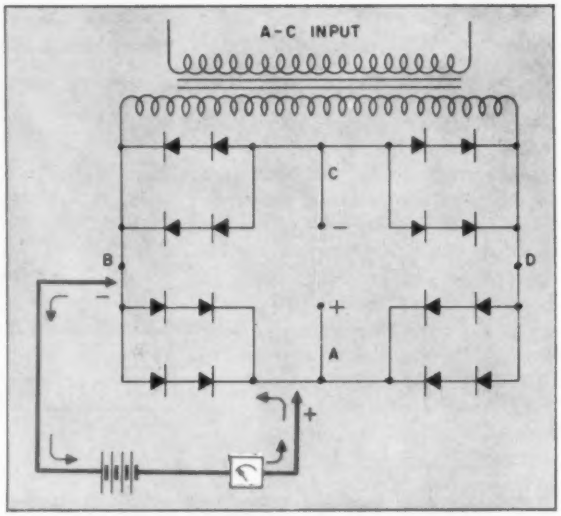


Fig. 12. Reverse current or blocking check using d-c tester

terminal and a d-c terminal an arm of the stack. This could be a single plate but in most rectifiers consists of a large number of plates. Some are connected in series to obtain higher voltage ratings and others are connected in parallel to obtain higher current ratings.

Checking an entire arm of a rectifier can be accomplished by connecting an a-c voltmeter across it while it is under load, Fig. 11. If the voltage is much higher across one arm than another, then the arm with the high voltage is defective. If the input and output readings indicate that the trouble is in the stacks but all readings are equal, then all the arms are defective.

This does not check stacks arranged in parallel unless they are disconnected and tested separately. Good stacks are rarely left connected in parallel with defective stacks.

With a source of d-c voltage available, a stack can be checked with current and voltage, Fig. 12. If the positive lead is connected to "A" and the negative lead to "B" or "D," the stack should block the flow of current. Current flow should not exceed two milliamperes per square inch of rectifier surface under rated voltage.

Assuming five inch by six inch plates, with two plates in parallel, the limit would be 120 ma. Both "D" and "B" to "A" would be checked. Then the negative would be connected to "C", and "B" and "D" again checked. In this manner all plates of the stack will have been checked in the reverse direction.

Checking the forward voltage drop characteristics of the stack can be done with a high d-c voltage in series with a current limiting resistance, Fig. 13. The resistor is adjusted to limit current to one half of the single phase bridge rating.

In this case, the five inch by six inch plate would be tested at four amperes per plate or eight amperes for two plates in parallel. The polarity of the connections in this test are just the reverse of those used in the blocking test.

New plates should show a forward voltage drop of about 0.95 under this test. If the voltage reading per plate reaches over two volts, the plate is usually considered to have reached the end of life. With two plates in series, a reading of around three volts would be satisfactory. The other elements of the stack can be similarly checked.

Stacks can also be checked with an ohmmeter. It must be borne in mind, however, that an ohmmeter measures resistance by passing a very small current through the work under test. Unfortunately, rectifiers are unpredictable at such low currents and the readings cannot be used as an accurate guide to the condition of the stack.

The readings can be used by comparison, as in previous examples. Remember to check from an a-c lead to a d-c lead and in this case read both polarities. In other words, check both the conducting and blocking resistances. A variation in blocking resistance is not very important unless you are looking for a reason for heating in the stacks.

High forward resistance in some arms compared to consistent low readings in other arms would indicate trouble. The actual readings should not be over a few ohms for each plate in series.

As part of your preventive maintenance program, check ohmmeter readings of stacks at normal operation. Enter these readings on a card. When in trouble, compare with new readings to find stack at fault.

Emergency Connections

If all the stacks in one arm are found defective, stacks from another arm can be split up and put in their place. The rectifier can then be used at a reduced rate, determined by the proportion of stacks in the arm with the least stacks.

As an example, consider a rectifier with 36 stacks, Fig. 14. The circuit is arranged with six stacks in parallel in each arm and six arms, one between each of the three a-c leads and each of the two d-c leads. Consider all six stacks of one arm defective.

Three stacks of one of the other arms could be disconnected and reconnected in place of the six defective units. The unit could then be operated at half load. Another method, which is more practical, is to take one stack from each of the five other arms and connect these

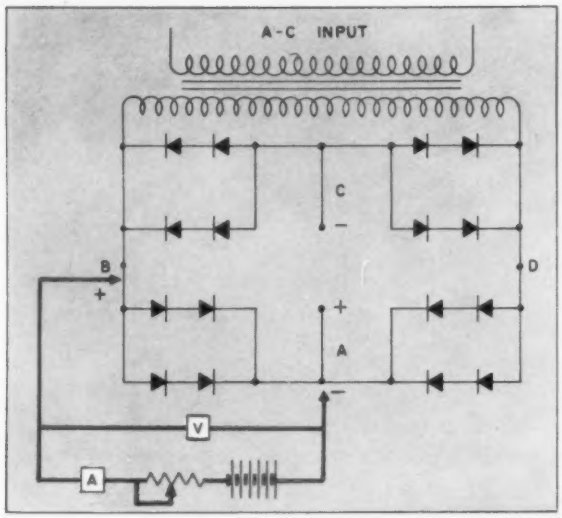


Fig. 13. Current limiting tester for forward voltage-drop

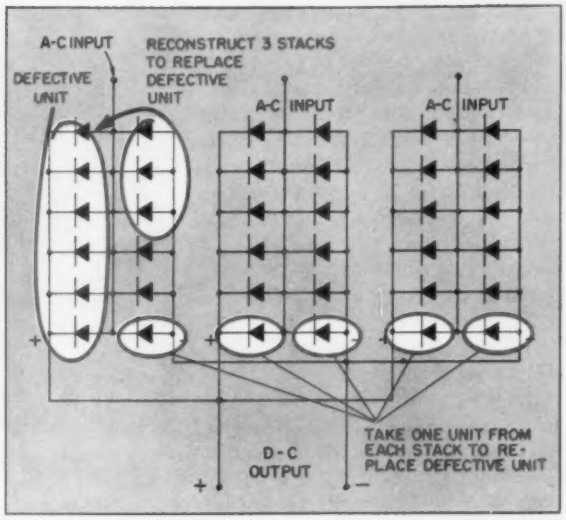


Fig. 14. Good stacks may be substituted for defective units

five in place of the defective arm. The unit could then be operated at five-sixths of the rated load.

Maintenance of selenium rectifiers is very simple. The surfaces of the individual plates must be kept free of dirt so they can effectively dissipate heat generated by internal losses and they must be kept away from injurious fumes.

It will help to understand the importance of keeping these units clean if it is borne in mind that the plate area is used for rectifying and also to dissipate the losses of the plate which arise as heat. Each one of the plates of the stack is an individual rectifier or switch. During operation of the rectifier, each cell is alternately conducting or blocking.

When a cell is blocking, a few thousandths of an ampere still flows, and when it is conducting, there is about a volt drop across it.

Like a contact then, a rectifier has internal losses which generate heat and must be dissipated. A contact has lower losses but the selenium plate has a much larger surface to dissipate its heat from, so neither one should run hot if it is operated within its rating.

Modern selenium rectifiers are coated with a remarkably tough and durable paint. In laboratory breakdown tests, rectifiers have been overloaded until the metal in contact with the selenium melted. It runs down inside the paint film and builds up bulges along the bottom of the plate before it breaks through and runs out. There is no apparent damage to the paint and sometimes even the rectifying agent remains usable, although such heavy overloads usually produce some damage if not complete failure.

This high quality paint is used to protect the stacks, particularly against moisture. Selenium is adversely affected by moisture when standing unused. In use, there is little danger unless there is an actual condensation or dripping on the stacks. This must be avoided. To preserve this paint film be very careful not to strike the edges or corners of the plates or lay any tools on stacks while cleaning them.

Cleaning Rectifiers

Cleaning is commonly done in an air stream from a portable blower. Compressed air does a better job but must be checked for cleanliness.

Solvent cleaning can be used if the rectifier accumulates a deposit that sticks to the stacks. This can be sprayed on or applied with a brush. Care must be taken to prevent scratching the finish.

Check your cleaning solvent on the nuts or other inactive parts of the stack to make sure it will not soften the finish. Do not use a solvent that will leave an oily residue as this will cause the stack to collect dirt more rapidly.

When cleaning the stacks they should not be immersed in the solvent as there are many small crevices around the center insulator and between the washers and plates. The solvent may wash dirt and moisture into these crevices where it would be difficult to remove.

Maximum operating temperature for a standard selenium cell is 75 C or 167 F. If your cells are operating close to this temperature it will be necessary to keep them very clean. If they are not, it will not be necessary to clean them as often. Thus during the winter, or on a unit operating under light load, cleaning will be less frequent.

The temperature of the cells can be measured by a thermocouple or mercury bulb thermometer held in contact with one of the inner cells of a stack with a piece of putty.

For extremely adverse conditions it may be desirable to immerse the stacks in oil and seal the container. This does not seriously affect the rating of the stack due to the excellent thermal conductivity of the oil. It is very expensive, however. One way of doing this is to buy the individual stack hermetically sealed in a can by the manufacturer. This adds approximately $50 to the cost of each rectifier stack.

Chart I can be used to estimate the rating of a stack in an emergency. If time permits it is always desirable to check with the manufacturer for the exact rating. Usually, the lowest voltage plate commonly used is rated at 18 volts. Most plates are 26-v plates and some are as high as 40 volts. The ratings in chart I apply for stacks of 17 or more cells having minimum spac-

ing considered necessary for satisfactory operation.

These are standard plate sizes. Since rating is proportional to area, the rating of any non-standard plate could be estimated by comparing its area to the area of the plates in the table. A stack may be used on a lower voltage than its rating. If a 26-v plate is operated on 18 volts, it will operate cooler and last longer. It is relatively safe then, to assume 18-v plates since very few are sold below this voltage.

It is well to remember that the graph is for a basic circuit with one cell in series and one cell in parallel. Doubling the number of cells by connecting an additional cell in parallel with each original cell doubles the current rating of the stack. Similarly, the voltage ratings can be doubled or tripled by putting one or two cells in series with each cell in the circuit.

Watch These, Too!

There are some additional points about rectifiers that should be known and understood. The fan-cooling of stacks increases rectifier ratings and, consequently, saves space and money. Unfortunately, this also increases regulation and maintenance, decreases overload capacity and shortens the life of the unit.

Be sure the regulation or fluctuation of the d-c voltage under load of the units you are considering will not cause trouble with your load. If it does, request a quotation on units of the required regulation. Check cabinet construction for ease of maintenance. Install the unit so that all sides are available for maintenance and have a free circulation of air.

Determine if your equipment has an overhauling or regenerating effect during any part of its load cycle.

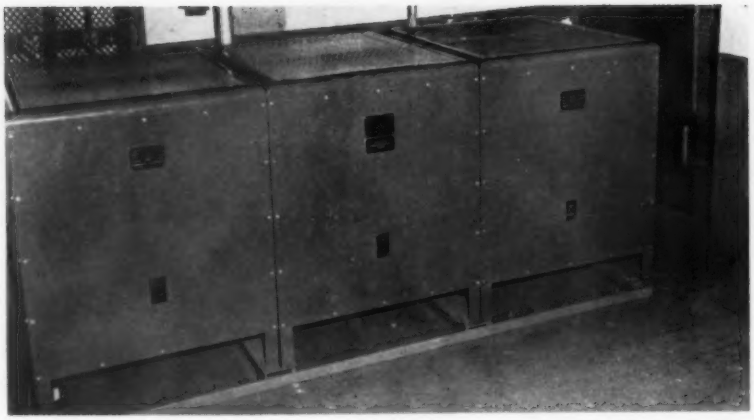


Fig. 15. Compact bank of three parallel 50 kw rectifiers delivers 150 kw to load

As an example, a crane or elevator may operate as a generator when lowering a load and try to push current back through the rectifier. This application will require special equipment available from most rectifier manufacturers.

Small pulsations, called ripple are present in the d-c output of large selenium rectifiers. This is commonly less than five per cent and rarely causes trouble on plant equipment.

Overload must be considered not only from the standpoint of what is required from the rectifier, but also the thermal demand on the rectifier just before the overload is applied. If the unit has been operating at full load in its maximum recommended temperature for a period of 15 minutes or more, it can be assumed that it has reached the maximum plate temperature of 75 C and therefore has no overload capacity left.

In actual practice, we have about a 10 per cent safety factor in our ratings. This investment in slightly more capacity is well returned in additional life and better regulation. Full capacity of the selenium stack is necessary for overloads of 15 min and above, but a smaller transformer may be capable of handling the job. Units are available, designed specifically for these duty cycles.

Motor starting, with its shorter periods of time, presents a different problem. If the rectifier is cool, it can stand overloads up to five times its normal convection rating. The regulation and full load voltage drops considerably, however. Starting currents of twice the normal rating of the rectifier can be frequently applied. This factor changes, of course, with duration of the overload and initial cell temperature.

One of the leading stack manufacturers advises their stacks will have an operating life in excess of 80,000 hours when operated at full load with convection cooling. Longer life can be obtained by derating. For a 40-hr week, the unit will operate at full load for 38 years. For a two shift operation, 19 years of service can be expected. As few operations continue at full load throughout the working day, longer life can be expected in most applications.

Cells with life ratings over 100,000 hours are available from some manufacturers. These cells were developed in Europe and are being manufactured in this country under a licensing agreement. **End**

Chart I. Characteristics of unknown selenium stacks can be closely estimated using voltage and ampere figures from table

Circuit	Plates	D-c Voltage With 18-v input	D-c Voltage With 26-v input	D-c Ampere Ratings of Standard Plates (dimensions in inches) 1.25x 1.25	1.6x 1.6	2.2x 2.2	3x3	4x4	4x6	5x6	6.25x 7.25
Single phase center tap	2	6	9.5	0.3	0.6	1.2	2.4	4	6	8	12
Single phase bridge	4	12	19	0.3	0.6	1.2	2.4	4	6	8	12
Three phase 1/2 wave	3	9.75	15	0.4	0.8	1.6	3.2	5.33	8	10.66	16
Three phase bridge	6	19.5	30	0.45	0.9	1.8	3.6	6	9	12	18

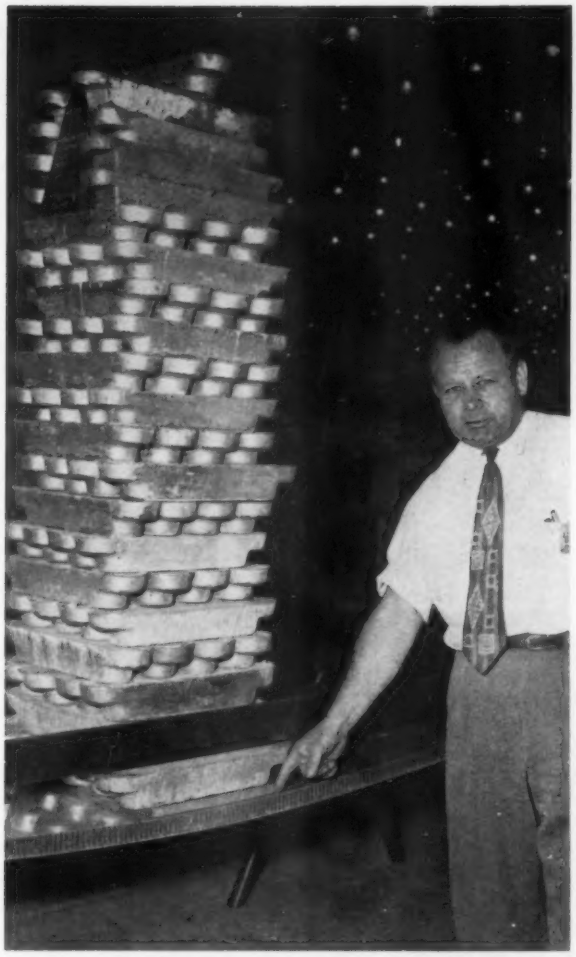


Fig. 1. This Aircomb panel is loaded with 4300 lb of lead. Total deflection is only 4 in. Permanent set to panel after this extreme test load was removed was less than ¼ in.

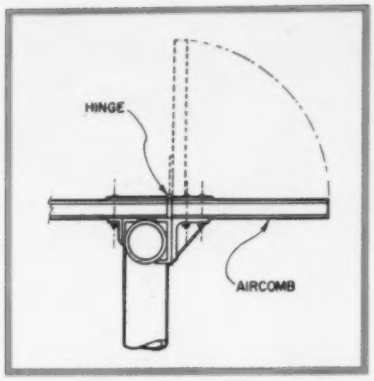


Fig. 2. How work platforms are hinged

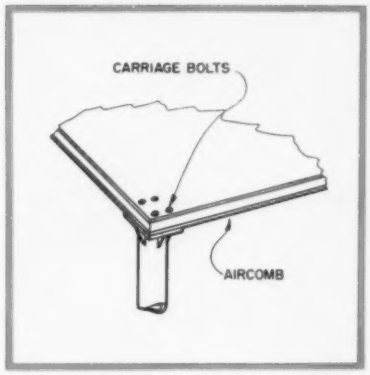


Fig. 3. How legs are attached to sheet

Lightweight Work Platforms—

They're Tough, Safe, and Easily Built

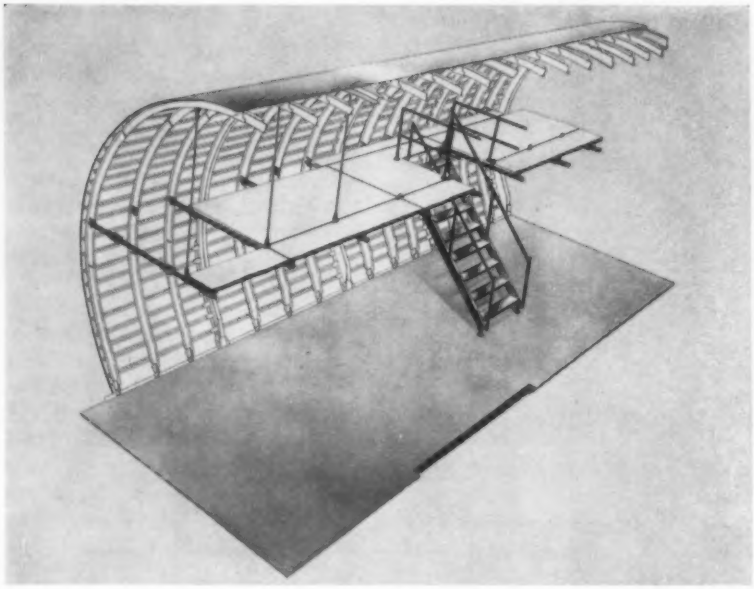
FOR SEVERAL years lightweight Aircomb work platforms have been providing yeoman service at the huge Douglas Aircraft Company plant at Long Beach. These work platforms have many advantages over the more conventional tongue-and-groove plant work platforms used in many plants where elevated assembly line working positions are necessary.

In pointing out the advantages of this paper honeycomb material sandwiched between aluminum plates Douglas engineers first stressed problems common to all work platform construction, then detailed the disadvantages of the materials formerly used.

In the construction of any work platform, the supporting structure must be specifically designed to provide means of attachment and full support. The weight of the workman, his tools, and sometimes his work-bench, must be supported, and the work platform flooring and its supporting structure must comply with all State, Insurance, and Company safety regulations.

Due to the configuration of some large assembly-line-produced structures, especially airplanes, it is frequently necessary to design portions of the work platforms flooring to fold or hinge out of the way so that the structure being assembled can be moved into and out of an assembly jig.

In other cases the work platforms may have to be folded out of the way to expedite certain phases of actual assembly. Many of the work platforms, such as cross-blocking members, may have to be removed



This wash drawing shows how the lightweight work platforms can be erected inside any production structure, such as an airframe, or inside any plant building

entirely from the supporting structure during line moves, and with some very large assembly line structures, work platforms must be moved inside the structure to provide elevated working positions.

The weight of these hinged and removable platforms when using conventional platform materials has always been an industrial safety hazard. And when any part of the assembly line jig is used as a hold or tooling point for locating the heavy supporting structures for these heavy platforms, the jig structure itself must be heavier and thus becomes more costly.

Tongue-and-groove pine lumber most frequently used for work platforms exhibits consistent faults. It shrinks in the dry atmosphere of most plants, and soon develops sufficient space, even through the tongue-and-groove joint, so that dust and metal chips will sift down on the workers below, creating a specific hazard to eyesight. Small rivets, screws, nuts, cotter pins, and metal chips will become lodged in the platform cracks, making them difficult to sweep. While plywood platforms overcome the sifting problem, they are still very heavy and tend to delaminate and splinter.

In building platforms for the airplane assembly lines, the diamond plate steel platforms proved excessively heavy, and expanded metal platforms only increased the sifting of dangerous dirt on those working below.

Several investigations relative to an optimum work platform material were conducted before the Aircomb material was selected. Lightweight aggregate concrete panels, as well as pre-stressed concrete panels were designed and tried. Special wood panels and built-up aluminum alloy panels were designed and investigated. Diamond plate and expanded panels were also considered.

Finally the work platform panels illustrated with this article were adopted as standard jig and work platform flooring for both fixed and hinged floors, as well as for removable platforms. This panel is made up of a core of Douglas Aircomb paper honeycomb bonded onto a top and bottom facing of 0.064 gauge 24 ST 4 aluminum alloy sheet.

Strength-to-weight ratio of this panel is extremely high compared to the materials previously used. As illustrated in Fig. 1, a panel 24 in. wide by 96 in. long was loaded with 4300 lb of lead concentrated at the center of the span. Under this load, the panel deflected only 4 in. at the center and, as shown, the deflection followed a smooth curve. When this extreme test load was removed, permanent set was less than ¼ in.

High strength of such panels is due to their shear web construction over a non-yielding core of paper honeycomb. This shear web construction is ideally suited to overhanging or folding or cantilever-type access platforms similar to those diagrammed in Fig. 2. Adjustable torsion spring hinges have been designed to compensate for the weight of the hinged platform.

Principal advantage is that adequate strength is inherent in the panel itself and no sub-structure is required. This elimination of the supporting structure required for conventional wood platform flooring not only simplifies design, but provides the production department

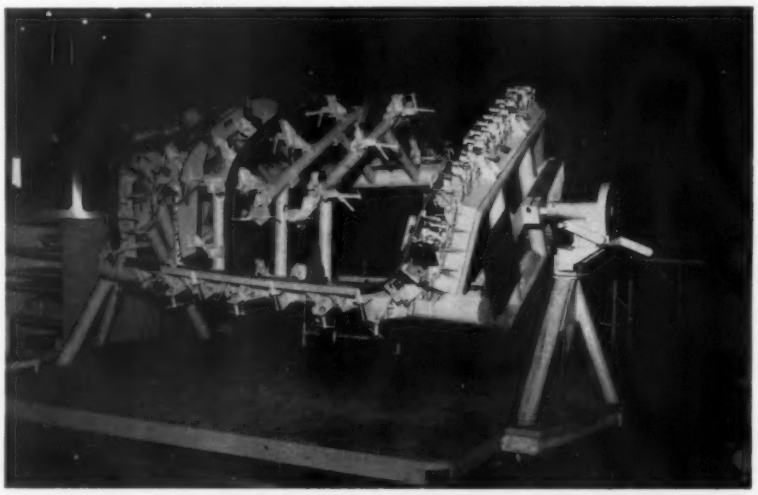


Fig. 4. The same material is also used extensively for floor-level work platforms surrounding smaller assembly jigs. Edges of material are filled with wooden strips

with work areas that are free of braces and other structural impediments under the flooring of the overhead work levels.

In the construction of lightweight movable work platforms with the Aircomb material, attachment of tubular legs is made directly to a welded plate which in turn is fastened to the Aircomb with carriage bolts. See Fig. 3. When very high unit loads will affect the leg attachment point, spacers are used between the facing plates.

While at first, a hard putty was used to fill the raw edges of the Aircomb material, this practice was discarded in favor of wood inserts along the edge. The paper honeycomb material is routed out to a depth of ¾ in., then a ¾ in. thick strip of wood is inserted between the panel face plates to fill the groove so formed. The wood is held in place by flathead screws driven in from the outside of each face.

When rounded panel corners are necessary, rounded wood inserts shaped to match the arc of the panel corner are used. Where members of the supporting structure for the work platform must pass through the floor panel, the space between the member and the panel is filled with putty.

For ordinary uses, where they will not be exposed to an excessive amount of cutting oils, a coating of gray deck paint similar to that used on salt water sail boats is used to coat the Aircomb floor panels. **End**

Fig. 6. Here a workman folds a section of a work platform into place. Note the simplicity of the supporting sub-structure made possible by extreme light weight of the material. Platforms may be protected by applying deck paint to surfaces

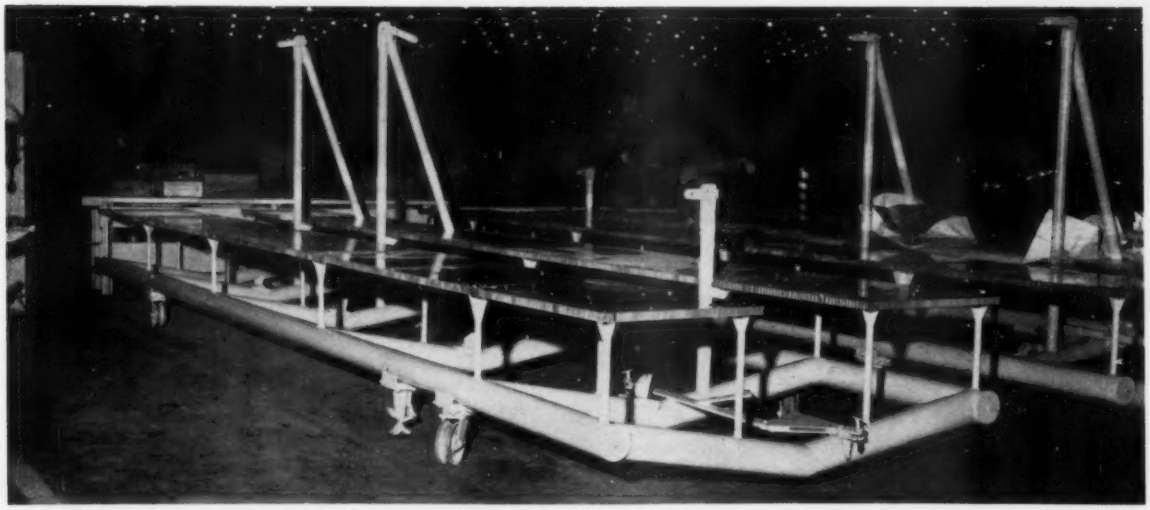


Fig. 5. While these lightweight platforms are used advantageously for general applications they are especially helpful when work platforms must be erected inside structures such as the huge airplane fuselages on Douglas' production lines

Fig. 1. Master file system contains life history of more than 700 major machines. Data serves to control maintenance

Fig. 2. Maintenance foreman studies Breakdown Cards posted on board in his office. Cards tell which machines are down

Maintenance System for Top Machines

Card Index Keeps Finger on Equipment's Pulse

By C. M. VIGIL, General Foreman, Maintenance
Plant Engineering Department, El Segundo Division, Douglas Aircraft Co.

A CARD INDEX system in the Plant Engineering Department's central plant maintenance office at the El Segundo Division of Douglas Aircraft Company contains the life history of each one of the more than 7000 major machines (machines costing $1000 or more) in operation in the plant. Each machine has its own folder in the Kardex file. Into this folder goes the data on every transaction that affects the machine from the day it is installed until it is worn out or retired from use.

But this Kardex System and the record-keeping that is supplementary to it is far more than an accumulation of historical data. It is a vital and controlling factor in keeping the more than 7000 major machines in tip-top operating condition, and in handling the more than 5500 maintenance calls which enter the central maintenance office every month. When a machine maintenance call results in a maintenance job that costs $25 or more, that requires more than four hours machine downtime, or that will keep a machine idle over a workshift change, all data on this job eventually finds its way into the machine's Kardex file, Fig. 1. But in the course of doing so, this same data is used to control the maintenance work as it progresses.

The accumulation of data on any one machine serves as excellent reference material in determining future policies concerning that particular machine. Each machine's file—an example is shown in Fig. 3B — is reviewed at least once a year. If the file reveals that a machine is operating efficiently with only normal maintenance attention, all is well and good. But if the file reveals that during the past year the machine has required an unusual amount of maintenance work to keep it operating within required tolerances and at the proper speed, this machine is scheduled for a trip to the Plant Engineering Department's major machine overhaul shop where it is rebuilt from the ground up.

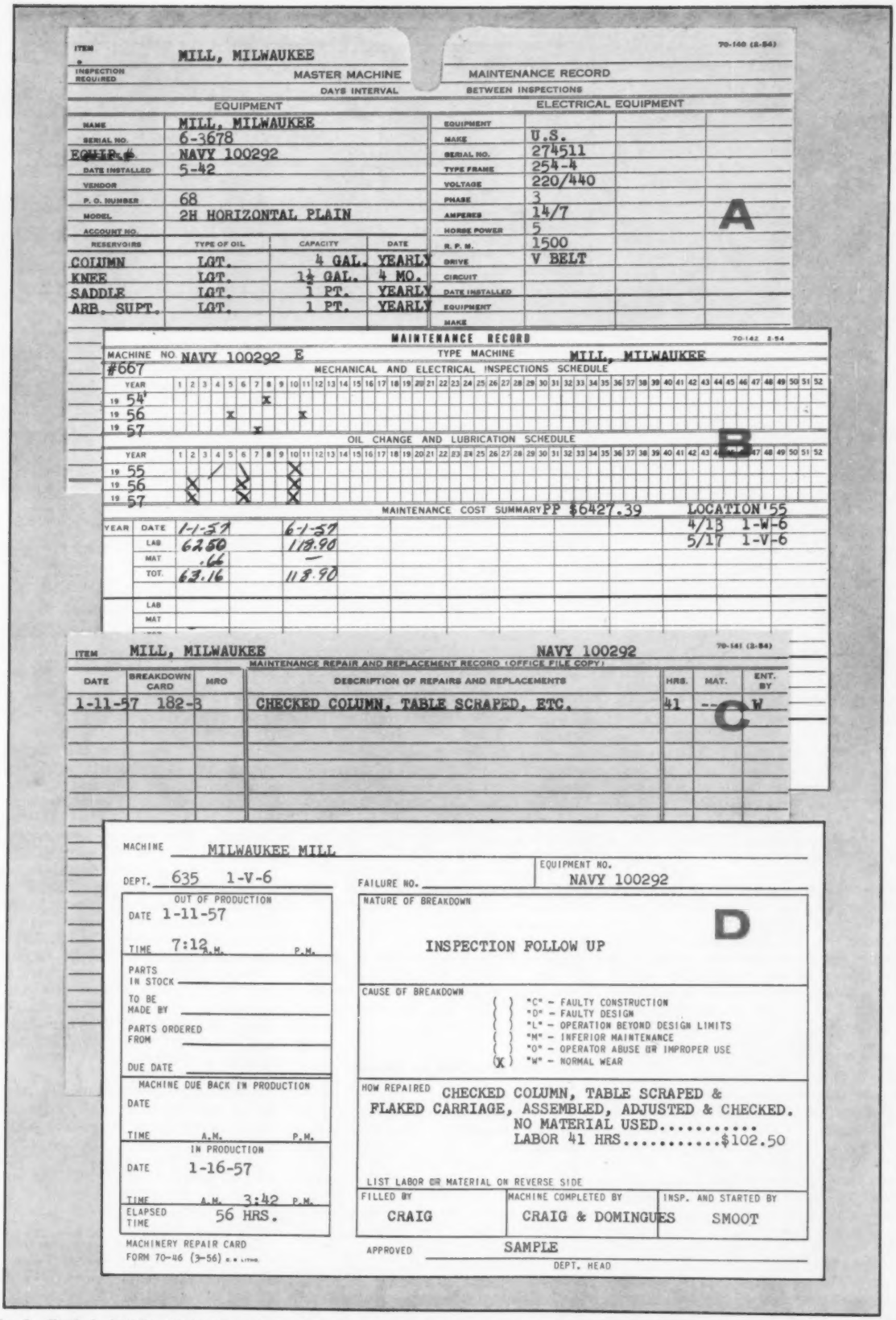
Cards Give Whole Picture

Furthermore, because of the prior information furnished by the machine's Kardex file, it can be scheduled for a major overhaul at a time when its removal from the production will cause a minimum of inconvenience.

The Kardex file data on maintenance work is supplemented by the original and subsequent periodic inspection reports on each machine which are kept in a separate file, but are cross-indexed to the Kardex system. When a machine is installed, the original inspection report (made at the time of installation) provides a comprehensive analysis of its condition at the time. Periodic inspections (usually annual) are made thereafter by personnel who devote their entire time to machine inspections. An accumulation of these periodic inspection reports on a specific machine provides a true picture of its service life and gradual deterioration or wear. Such information is extremely valuable, not only in determining whether or not a machine needs a major overhaul, but in a longer perspective, which machines are better than others.

A big advantage of this major machine record keeping system accrues, however, even before the information reaches the Kardex files. This has to do with the way specific maintenance jobs are handled. Even as the information is being accumulated for the Kardex file, it serves the very useful purpose of controlling the maintenance work as it progresses. As this system has definitely proved its value at Douglas, it will be explained in detail so that other Plant Engineering Departments may adapt it to their own plants if they so desire.

To begin with, the Douglas plant is



ITEM MILL, MILWAUKEE — 70-140 (2-54)

INSPECTION REQUIRED — MASTER MACHINE MAINTENANCE RECORD — DAYS INTERVAL — BETWEEN INSPECTIONS

EQUIPMENT — ELECTRICAL EQUIPMENT

NAME	MILL, MILWAUKEE	EQUIPMENT	
SERIAL NO.	6-3678	MAKE	U.S.
EQUIP. #	NAVY 100292	SERIAL NO.	274511
DATE INSTALLED	5-42	TYPE FRAME	254-4
VENDOR		VOLTAGE	220/440
P. O. NUMBER	68	PHASE	3
MODEL	2H HORIZONTAL PLAIN	AMPERES	14/7
ACCOUNT NO.		HORSE POWER	5
		R. P. M.	1500
		DRIVE	V BELT
		CIRCUIT	
		DATE INSTALLED	
		EQUIPMENT	
		MAKE	

A

RESERVOIRS	TYPE OF OIL	CAPACITY	DATE
COLUMN	LGT.	4 GAL.	YEARLY
KNEE	LGT.	1½ GAL.	4 MO.
SADDLE	LGT.	1 PT.	YEARLY
ARB. SUPT.	LGT.	1 PT.	YEARLY

MAINTENANCE RECORD — 70-142 2-54

MACHINE NO. #667 NAVY 100292 E — TYPE MACHINE MILL, MILWAUKEE

MECHANICAL AND ELECTRICAL INSPECTIONS SCHEDULE

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
19 54								X																																												
19 56					X					X																																										
19 57							X																																												

OIL CHANGE AND LUBRICATION SCHEDULE

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
19 55																																																				
19 56	X				X					X																																									
19 57	X				X					X																																									

B

MAINTENANCE COST SUMMARY PP $6427.39

YEAR	DATE	1-1-57	6-1-57
	LAB	62.50	118.90
	MAT	.66	—
	TOT.	63.16	118.90
	LAB		
	MAT		

LOCATION'55
4/13 1-W-6
5/17 1-V-6

ITEM MILL, MILWAUKEE NAVY 100292 — 70-141 (2-54)

MAINTENANCE REPAIR AND REPLACEMENT RECORD (OFFICE FILE COPY)

DATE	BREAKDOWN CARD	MRO	DESCRIPTION OF REPAIRS AND REPLACEMENTS	HRS.	MAT.	ENT. BY
1-11-57	182-B		CHECKED COLUMN, TABLE SCRAPED, ETC.	41	--	W

C

MACHINE MILWAUKEE MILL

DEPT. 635 1-V-6 — FAILURE NO. — EQUIPMENT NO. NAVY 100292

OUT OF PRODUCTION
DATE 1-11-57
TIME 7:12 A.M. P.M.
PARTS IN STOCK
TO BE MADE BY
PARTS ORDERED FROM
DUE DATE

MACHINE DUE BACK IN PRODUCTION
DATE
TIME A.M. P.M.

IN PRODUCTION
DATE 1-16-57
TIME A.M. 3:42 P.M.
ELAPSED TIME 56 HRS.

MACHINERY REPAIR CARD
FORM 70-46 (3-56)

NATURE OF BREAKDOWN
INSPECTION FOLLOW UP

D

CAUSE OF BREAKDOWN
( ) "C" - FAULTY CONSTRUCTION
( ) "D" - FAULTY DESIGN
( ) "L" - OPERATION BEYOND DESIGN LIMITS
( ) "M" - INFERIOR MAINTENANCE
( ) "O" - OPERATOR ABUSE OR IMPROPER USE
(X) "W" - NORMAL WEAR

HOW REPAIRED CHECKED COLUMN, TABLE SCRAPED & FLAKED CARRIAGE, ASSEMBLED, ADJUSTED & CHECKED.
NO MATERIAL USED.....
LABOR 41 HRS.....$102.50

LIST LABOR OR MATERIAL ON REVERSE SIDE

FILLED BY	MACHINE COMPLETED BY	INSP. AND STARTED BY
CRAIG	CRAIG & DOMINGUES	SMOOT

APPROVED SAMPLE
DEPT. HEAD

Fig. 3. Card A details electrical equipment on machine and sets up a lube schedule. Card B provides space for check-off of schedule D periodic inspections and lubrication, lists cost of machine, and provides summary of maintenance costs. Card C lists totals of all Breakdown Cards and is cross indexed to all such cards that may be filed on this machine. Card D is a Breakdown Card made out by maintenance inspector. This card is posted on board until job has been completed

divided into specific maintenance areas, with an assistant maintenance foreman in charge of each area. Information to and from these areas is handled by Telautograph through a central dispatcher's office located adjacent to both the Kardex file office, and the offices of both the Foreman and General Foreman of plant maintenance.

This arrangement, in effect a nucleus for all maintenance work being done in the plant, provides for a minimum of lost time and waste motion, and makes record keeping so "up to date" that it actually affects maintenance work being done in the plant at the time the records are posted. More specifically, the maintenance work and the development of the data which will eventually reach the Kardex file, proceed abreast.

When Breakdown Comes

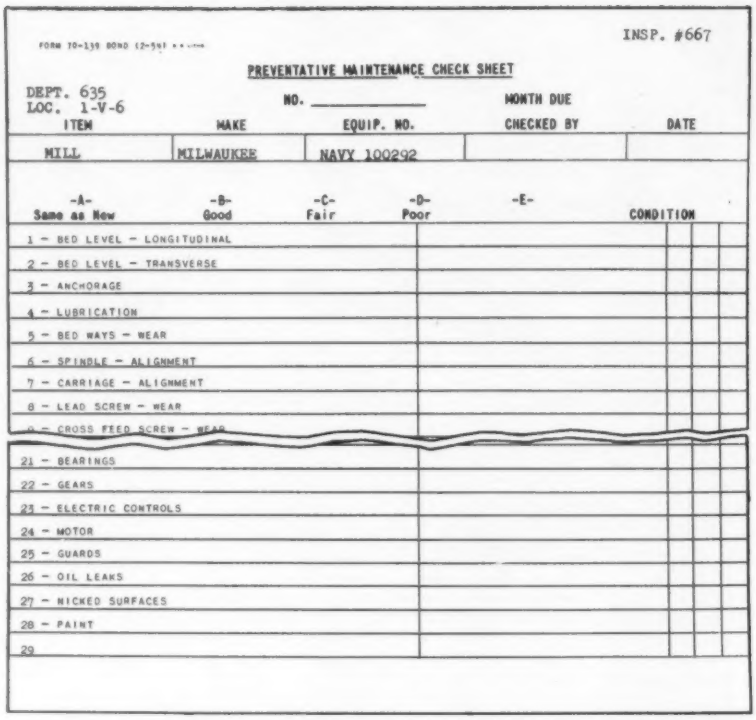
When a machine breaks down, the maintenance dispatcher's office is notified immediately. The dispatcher then notifies the assistant maintenance foreman of the plant area in which the breakdown occurred. The assistant foreman then sends a machine inspector directly to the machine that is down.

If the inspection reveals that the repair job will cost less than $25, and that downtime will not exceed four hours or keep the machine idle over a workshift change, the repair is made on the spot, and charged against a general maintenance fund. But if the job will cost $25 or more, if downtime will exceed four hours, or if the machine will remain down over a workshift change, the machine inspector makes out a "Breakdown Card," Fig. 3D. Estimated labor and material costs are itemized on this card.

The inspector then calls the Kardex office for a permanent Breakdown Card number. At the same time, he gives the Kardex operator the data he has entered on the Breakdown Card so that a duplicate card can be typed in the office. The office copy is then posted on a large, wall-mounted Breakdown Board, Fig. 2, in the maintenance foreman's office. This Breakdown Board is color-coded to correspond to the various maintenance areas throughout the plant, and the Breakdown Card, of course, is posted with the color of the area in which the breakdown occurred. The foreman (and foremen on subsequent workshifts) can thus tell at a glance what machines are down, where they are located, the approximate time they will be down, and the estimated cost of the repair job.

The Breakdown Card made out by the machine inspector remains with the machine until it is repaired. Corrected figures (variations from the estimate) are entered on this card as the work progresses. When the job is done, the card is sent to the central maintenance office.

Appearance of the shop Breakdown Card at the central office indicates that its duplicate can be removed from the Breakdown Board. The figures on the two cards are then compared, and any changes from the original estimate are transferred to the typed office copy, Fig. 3C. Labor and material are then totaled on the office copy, and these totals, along with the date and the Breakdown Card number are posted to the Kardex file of the machine that has just been repaired. Next, the Breakdown Card is placed numerically in a file that becomes supplemental to the master Kardex file. While the Kardex file on the machine indicates the total costs on each repair job, the cross-index leads directly to the Breakdown Card for detailed information whenever it is needed.



INSP. #667

PREVENTATIVE MAINTENANCE CHECK SHEET

DEPT. 635
LOC. 1-V-6
NO. _____
MONTH DUE

ITEM	MAKE	EQUIP. NO.	CHECKED BY	DATE
MILL	MILWAUKEE	NAVY 100292		

	-A- Same as New	-B- Good	-C- Fair	-D- Poor	-E-	CONDITION
1 – BED LEVEL – LONGITUDINAL						
2 – BED LEVEL – TRANSVERSE						
3 – ANCHORAGE						
4 – LUBRICATION						
5 – BED WAYS – WEAR						
6 – SPINDLE – ALIGNMENT						
7 – CARRIAGE – ALIGNMENT						
8 – LEAD SCREW – WEAR						
9 – CROSS FEED SCREW – WEAR						
21 – BEARINGS						
22 – GEARS						
23 – ELECTRIC CONTROLS						
24 – MOTOR						
25 – GUARDS						
26 – OIL LEAKS						
27 – NICKED SURFACES						
28 – PAINT						
29						

Fig. 4. This is an inspection form used by the maintenance department inspectors during periodic inspection. These forms are cross-indexed with master Kardex file

Records Double in Brass

From the above, it is quite evident that the documents used for record keeping are the same documents that control the maintenance job while it is in progress. This not only saves extra work, but eliminates the possibility of posting errors as the original typed Breakdown Card becomes a part of the permanent file.

The development of the Kardex file on each machine, as already indicated, starts when the machine is installed. The first entry, in addition to the original inspection report, is a master card listing the machine, its type, its original cost, and its location in the plant. This is supplemented by a master maintenance card, Fig. 3A, and a lubrication chart, Fig. 3B.

The lubrication chart lists the frequencies of lubrication at various places on the machine and the types of lubricants to use. The master maintenance card has spaces for checking off the periodic inspections when they are made (which are cross-indexed, of course, to the inspection sheet supplementary file), and for checking off machine lubrication as it occurs. Additional space on this card is used for listing the totals from the Breakdown Cards as they occur.

When an emergency breakdown occurs, the foreman of that production department fills out a "Critical Machines & Equipment Down For Repair" form and sends it by messenger directly to the desk of the foreman in charge at the time.

Some may claim that smaller plants do not need such detailed major machine maintenance record keeping — that machines are so few in number that the foreman in charge can literally keep all details in his head. This may be true as the work progresses. But the "head" is a very poor substitute for a filing cabinet.

The record keeping system in use at the Douglas El Segundo plant requires a minimum of effort relative to the size of the operation. Even less effort would be required in a smaller plant. And those of us who employ the system are fully convinced that diminishing returns would not prevail if it was scaled down in size. **End**

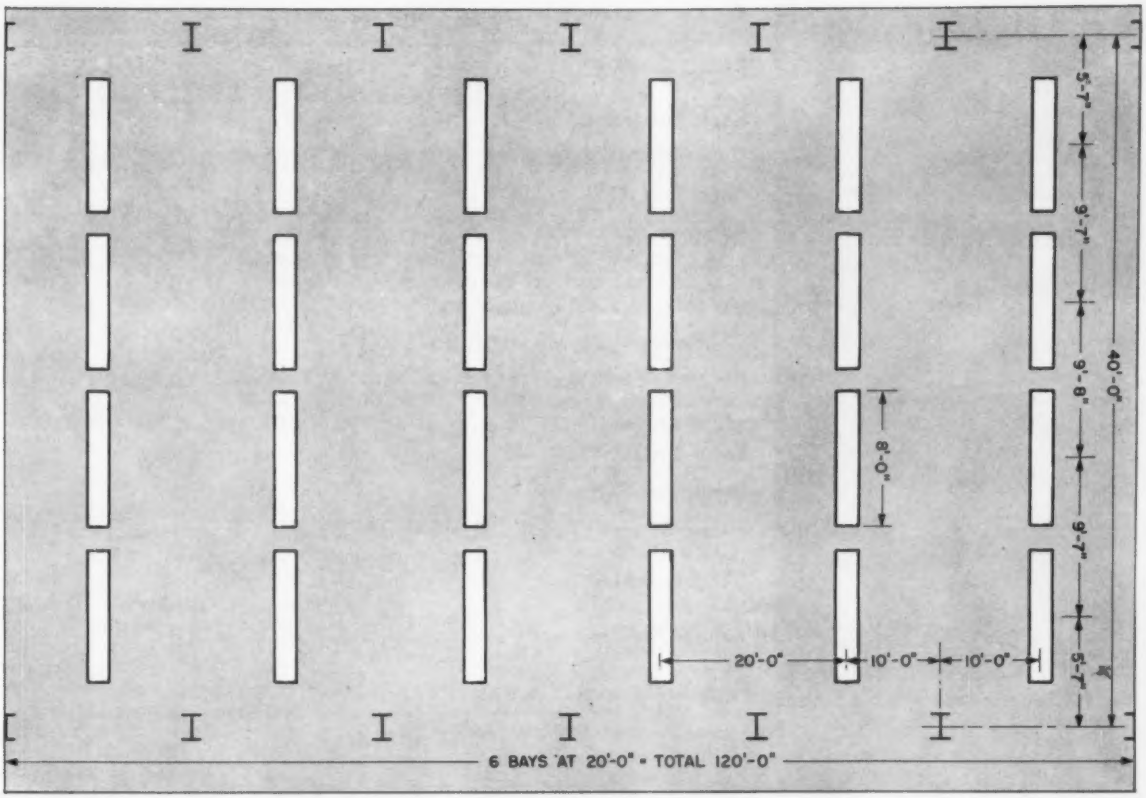


Fig. 1. Fixtures are arranged symmetrically in the available space after the total number has been determined in table

Low Cost High-Bay Lighting Solution

Design and Layout Data for Solving Your Lighting Problems

By D. N. SCHNEIDER, Sales Engineer, Central Illinois Light Company, Peoria, Illinois

PLANT EXPANSION recently completed at the Hyster Company, Peoria, Illinois, included 17,000 sq ft of additional shipping and receiving space. Among the many problems encountered during the construction project was consideration of new lighting systems. The lighting system in use in the existing areas has a 500 watt filament lamp in a glass prismatic reflector and is served through step-down transformers from the 480-v delta system.

Experience with the incandescent system indicated that a point source, such as filament or mercury, provided inherent brightness and undesirable shadow effects that could be virtually eliminated with a properly designed fluorescent system. Longer lamp life, slotted fixture design to reduce dirt accumulation on reflector surfaces and improved brightness ratios gave further support to the choice of a fluorescent source.

After the fixture has been selected and the design footcandle level established, the table is prepared to find out how many fixtures will be required in the area.

With mounting heights of 20 and 33 ft, the new area could definitely be classed as a high-bay installation. The 96 in. T 12 high output lamp seemed ideally suited to this application and several styles of industrial fixtures were available for its use. The ballasts were designed to operate directly on the 480-v delta system.

This lighting plan made possible large monetary savings through the elimination of step-down transformers, smaller wire and conduit sizes, fewer circuits and savings in labor costs through the simplicity of the entire system. Through these economic features, plus savings in energy costs, it was determined that the difference between the new fluorescent lighting and an equivalent incandescent system could be offset

Fig. 2. High crane bay with old lighting in foreground shows reduction in glare

in approximately three years of use.

The 33 ft high-bay crane area is shown in Fig. 2, in direct contrast with a similar area of the old lighting system. A very noticeable difference both in lighting levels and comfort brightness ratios can be seen. Figure 3, shows the 20 ft high section of the additional area.

Lighting levels of 20 to 25 ft-c provides a sufficient quantity of illumination to satisfy most seeing tasks encountered in the area. Brightness ratios of three-to-one between the seeing task and the surrounding area provides excellent lighting quality. The use of light colors on room surfaces, slotted fixture tops, and large area illumination sources provides practically shadow-free illumination.

To keep even the finest lighting system up to design levels, it is very important to standardize on some method of systematic maintenance. This point was carefully considered in all stages of the planning. The 33 ft crane bay fixtures are easily maintained from the crane itself. Since the company manufactures lift equipment, it was easy to design a portable wooden platform that could be attached to one of the larger lift units for servicing the fixtures in the 20 ft high area. **End**

Table of data tabulation and calculations required to determine number of fixtures

BASIC DATA	HIGH BAY	LOW BAY
Room Dimensions	40 ft x 120 ft	100 ft x 120 ft
Ceiling Height	33 ft	20 ft
Room Index*	H	C
Required Footcandles	25	25
Fixture	Day-Brite CFI-10	Day-Brite CFI-25
Uplight	10 per cent	25 per cent
Coefficient of Utilization** C.U.	0.49	0.64
Maintenance Factor** M.F.	0.70	0.70
Lamps	F96T12/CW/HO	F96T12/CW/HO
Lamp Lumens***	7300	7300
Lamps per Fixture	2	2
Fixture Lumens	14600	14600

DESIGN DATA

$$\text{Fixtures Required} = \frac{\text{Footcandles} \times \text{Area}}{\text{Fixture Lumens} \times \text{C.U.} \times \text{M.F.}}$$

High Bay $\dfrac{25 \times 40 \times 120}{14600 \times 0.49 \times 0.70} = 24$ Fixtures required

Low Bay $\dfrac{25 \times 110 \times 120}{14600 \times 0.64 \times 0.70} = 50.4$ Fixtures required

To obtain a symmetrical pattern 59 fixtures were installed in the low bay resulting in a calculated footcandle level of 29.2

Notes: *From Illuminating Engineering Society Handbook. **From Fixture manufacturer. ***From lamp manufacturer.

Fig. 3. Low bay installation provides comfortable lighting for a variety of tasks

12 Points To Consider—
When Selecting Pressure Regulators

These are the points discussed by the author: 1. Does job require self-operated or pilot-operated unit? 2. Is vibration or shock present? 3. How about dependability? 4. Do wide load changes need pilot-operated unit? 5. Is frequency of setting point change a consideration? 6. Is convenience or accessibility of location the deciding factor? 7. What medium is being regulated through the regulator valve? 8. Is demand intermittent, requiring a single-seat valve for tight shut-off? 9. Is demand continuous, thus favoring a double-seated valve? 10. What inner valve characterization is needed? 11. How about regulator size? 12. Proper installation

By JOSEPH P. O'CONNOR, JR., Kieley & Mueller, Inc., Middletown, N. Y.

PRESSURE regulation is as old as the use of steam. The pressure gauge was the first industrial instrument and the pressure regulator was the earliest type of industrial control.

Every pressure regulator application involves special considerations which are briefly discussed in this article. It provides a guide to discriminating and judicious selection of the ideal regulator for the particular job.

The job may be any of the following: 1. maintaining a uniform reduced pressure; 2. maintaining a uniform back pressure; 3. relieving excess pressure or vacuum; 4. maintaining a uniform differential pressure; 5. maintaining a uniform reduced pressure by a two-stage reduction; and 6. governing a pump at constant or differential pressure. Figure 1 illustrates proper installation of a pressure regulator for pressure reduction; Fig. 2 for back-pressure control.

For these services, the choice may be restricted to only one or may be among several of the various basic styles of regulators.

1. Does the Job Require a Pilot-Operated or a Self-Operated regulator?

Generally speaking, a pilot-operated regulator has advantages over the self-operated type in being (1) more convenient to adjust and to service and (2) more versatile in its ability to handle extremes of supply or demand conditions. However, it is more expensive to buy and costs more to install. In addition, since the pilot-operated type consumes compressed air, an operating cost is entailed.

This is not to say that the self-operated regulator (aside from its lower initial, installation and operating cost) is without still other advantages. The self-operated regulator is an extremely simple device characterized by rugged dependability. Simplicity, ruggedness and favorable cost have combined to give it far greater usage than the pilot-operated type.

A self-operated regulator, plus its pressure connecting line and the fluid line being controlled, constitutes a closed control loop which is desirably short and uncomplicated. There is very little signal lag in such a control system

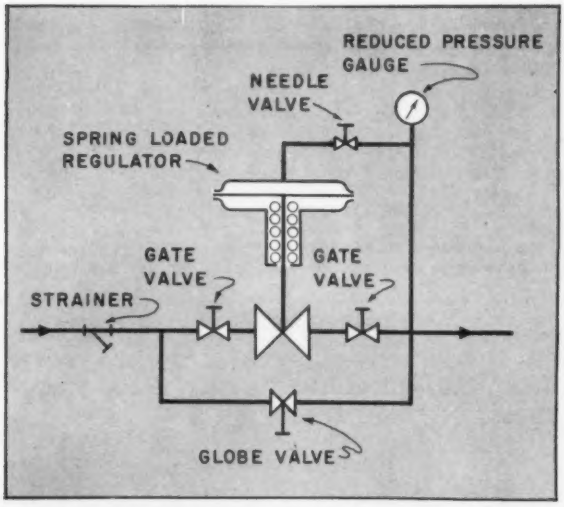


Fig. 1. Pressure reduction is the most common application for regulators. The inner valve indicated in this schematic diagram is of the direct acting type so that the spring—or weight—tends to open the valve. The pressure connection is made on the downstream side as shown in this diagram

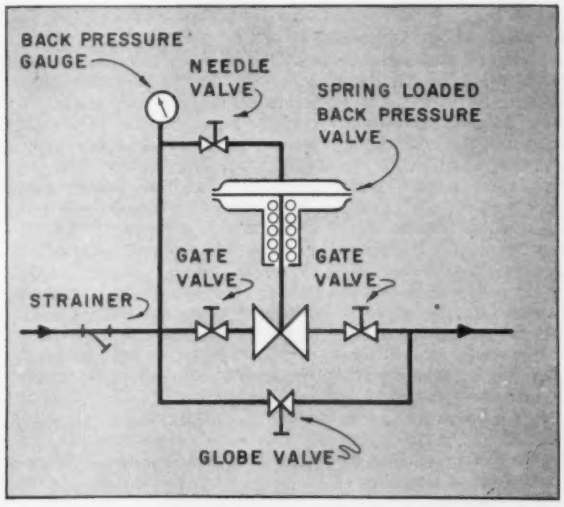


Fig. 2. Back pressure or relief control is another job frequently handled by regulators. The inner valve is of the reverse acting type so that the spring or weight tends to close the valve. Increasing diaphragm pressure causes it to open. Pressure connection is made on the upstream side

Table I. How to determine whether self-operated or pilot-operated regulator should be installed depending on service

Service	Supply Pressure Variations	Demand Load Changes	Type of Regulator Required
Moderate Reduction or Relief	Small supply pressure variations	Moderate	Self-operated
	Large supply pressure variations	Moderate	Self-operated
		Wide	Pilot-operated
Large Reduction (in single stage)	Moderate supply pressure variations	Wide	Pilot-operated
Large Reduction (in two stages)	Large supply pressure variations	Wide, in initial stage	Pilot-operated
		Moderate, in final stage	Pilot-operated or Self-operated
Special Case	Extreme demand load changes, such as seasonal loads, are sometimes best handled by two regulators installed in parallel with one regulator set slightly higher than the other.		

and, in this respect, the self-operated type enjoys a slight advantage over the pilot type. With a self-operated regulator, when the pressure tends to change, the corrective action begins almost simultaneously. There is no dead zone, lost motion, relay or mechanism delay.

2. Is Vibration or Shock Present?

Occasionally, the choice between self-operated and pilot-operated regulators may be dictated by special circumstances. For example, vibration or heavy shock may be present. In such an installation, weight-loaded self-operated regulators are not desirable. A spring-loaded regulator may be satisfactory, but with a pilot-operated regulator an undisturbed location may be found or, in any event, a shock-proof mounting can be arranged.

3. How About Dependability?

Possibly the self-sufficiency of the self-operated regulator might be the deciding factor. In some remote locations, failure of compressed air for a pilot-operated regulator might have costly consequences. The self-operated type has the considerable advantage of being operated by the controlled medium itself. Of course, in air or clean gas regulation, pilot-operated regulators can also be operated by the controlled medium if its pressure exceeds 25 psi.

To some extent the question of ultimate dependability can be provided with the air or water-operated pilot types by specifying the valve either direct-acting (spring-loaded) or reverse-acting (spring-closed). If the actuating medium should fail, the valve will either open wide or shut completely, depending upon which is the safer position.

However, usually this primary decision between self-operated or pilot-operated regulators will be based on the severity of the control job in relation to: (1) variations in supply pressure; (2) variations in demand load.

4. Do Wide Load Changes Require Using a Pilot-Operated Regulator?

If load variations are large, either because of considerable pressure changes on the supply side or because of variations of large magnitude on the demand side, the valve opening must be maintained at various positions. A "throttling range" is needed. What is "Throttling Range"?

In order to handle varying loads with self-operated regulators, the pressure in the diaphragm chamber must vary slightly from the set point. It is necessary to compress the spring or to lift the weight more or less . . . in order to hold the valve steadily at different openings. This spread or span of diaphragm loading is spoken of as throttling range. Throttling range is always desirable because it produces stability of control in contrast to "on-off" or hunting action which occurs when throttling range is absent or insufficient.

Adjustability of Throttling Range. The throttling range of a self-operated regulator cannot be easily adjusted on the job since it depends on valve lift, diaphragm size and spring characteristics. However, with a pilot-operated regulator, the throttling range can be quickly and easily adjusted. It is therefore possible to bring down the throttling range to the minimum value that will prevent hunting. Thus, the shift or "droop" of setting point with load changes can be minimized. Because pressure regulation is normally an uncomplicated, fast-responding control loop, the throttling range (or proportional band as it is also called) is usually narrow and the self-operated regulator gives excellent results in most cases. The complications of instrument type "reset action" to eliminate "droop" is rarely involved in pressure regulation. Table I shows when self-operated or pilot-operated regulators should be used.

"Over Pressure" in Relief Valves. A special example of throttling range may be mentioned in connection with back pressure and atmospheric relief valves. These valves require a certain amount of "over pressure" above their set pressure to reach full opening and maximum capacity. For instance, if a valve was set to open at 4 psi and its over-pressure rating was 25 per cent, it would not be wide open and passing full capacity until the pressure reached 5 psi. Percentages of over pressure are as follows: Pilot-operated, adjustable 1 per cent to 100 per cent, but usually set at 2 per cent to 5 per cent; weight loaded, 15 per cent to 20 per cent; spring loaded, 25 per cent to 40 per cent.

If your evaluation of cost, pressure fluctuations and load changes enables you to use either self-operated or pilot-operated types, several other points should be considered before making your final decision.

5. Is Frequency of Setting Point Change a Consideration?

Easier and more precise setting is possible with the more expensive pilot-operated regulator because it is furnished with a set-point knob which can be adjusted like a micrometer. Moreover, the indicating type pilot-operated regulator has a red setting pointer which references against a black indicating pointer on the same scale.

There is no need to wait and watch until the control assumes a new set point to see if more or less setting point manipulation is needed.

The set-point of a self-operated regulator is adjusted by reloading the spring in spring-loaded types or by moving the weight along the beam in weight-loaded types. If there are several customary set points, reference markings can be used to facilitate shifting from one set point to another.

Table II. The medium that is being controlled definitely influences type of regulator that is chosen for the service

	PILOT-OPERATED			SELF-OPERATED	
Flowing Medium	Air-Operated	Water-Operated	Steam-Operated	Spring Loaded	Weight Loaded
Steam	X	X	X	X	X
Air	X	X		X	X
Gas	X	X		X	X
Water	X	X		X	
Oil	X	X		X	

Obviously, then, in the matter of closeness and convenience of set point change, pilot-operated regulator have considerable advantage over the self-operated types.

Frequent change of setting point also necessitates consideration of convenient accessibility of the adjusting mechanism.

6. Is Convenience or Accessibility of Location the Deciding Factor?

Prescribed location of the regulator valve may influence the selection of the regulator type. It is just good practice and in the interest of good plant housekeeping to locate any piece of operating equipment in a readily accessible place where it can be inspected, adjusted or serviced with plenty of elbow room, in good light and under reasonably comfortable and safe conditions.

This is not always possible. Such ease of access, although always desirable, is not particularly essential with a mechanism as ruggedly dependable as a self-operated pressure regulator. However, the remote set pilot-operated type should be selected for extremely severe service or for service where frequent changes of control setting point must be made. The location of apparatus and the piping arrangement may determine the one and only location of the regulating valve as being 12 ft above the floor with no nearby stairs or walkway. The advantage of a remote set pilot-operated regulator in preference to a step-ladder is apparent.

Similarly, if the setting point must be quite frequently altered with reference to the operation of other apparatus or instrumentation, it may be highly advantageous to employ the pilot-operated regulator placed near the related equipment to actuate the remotely located control valve.

7. What Medium is Being Regulated Through Regulator Valve?

Note that, according to Table II, if the medium which will be controlled through the regulator valve is water or oil, you should not select the weight-loaded type of self-operated regulator. The steam-operated type can only be used on steam service. Other than these limitations, any type may be used for any medium. Of course, the body and trim material and rating selection must be appropriate for temperature, pressure, viscosity and corrosive nature of the medium.

Having now determined that your job requires a pilot-operated regulator or could be handled by either pilot type or self-operated type, you are prepared to make a final selection after you decide between a double-seated valve and a single-seated valve. Unless tight shut-off is involved, the double-seated valve is preferred because this semi-balanced valve is practically unaffected by fluctuation in supply pressure.

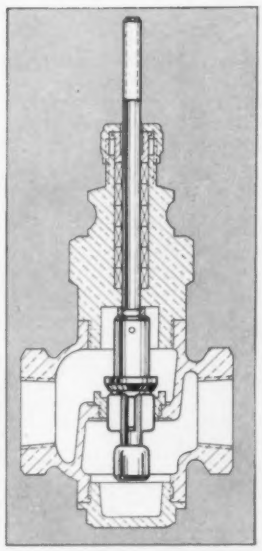
8. Is Demand Intermittent, Requiring a Single-seat Valve for Tight Shut-off?

Batch-type operations are inherently intermittent in demand and therefore require a single-seated regulator, as in Fig. 3, for tight shut-off in dead-end service. Apparatus subject to intermittent operation (in contrast to continuous operation) must have tight closure during the stand-by periods when no steam is needed, otherwise even a small leakage will finally permit full supply pressure to build up downstream.

For example, a hot water heater supplying shower baths in a locker room is subject to high demands at brief periods and almost no demand for many consecutive hours. A semi-balanced valve would permit the steam to overheat the water to a dangerous degree.

Batch operations requiring tight shut-off are usually steam heated apparatus in which articles or loads of material are heated for definite periods of time. They are typically small in size giving them limited demand side-capacity and are operated at moderate rather than high pressure.

Sterilizers, retorts, vats, kilns, pressers, ironers, mangles, dryers, ovens, kiers, and steam jacketed equipment customarily require single-seat regulators. Such regulators are usual on primary stage of two stage pressure reduction.



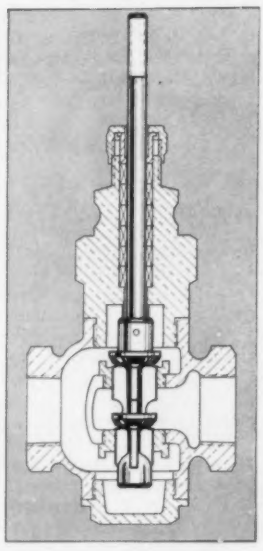


Fig. 3. Above: Single-seated valve for tight closing on dead end service. Fig. 4. Above: Double-seated valve for continuous service applications as shown in the text

Design of seat and seat ring material affect single-seat tightness. Metal-to-metal disc and seat ring are tightest with bevel seated construction. This is especially the case where high operating temperatures and pressures make necessary hard surfacing to resist erosion. For lower pressures and temperatures (below 300 psig and 475 F) the combination of flat metal seat and renewable composition disc is the preferable construction. Within its operating limits, the imbedding action of the metal seat into the softer material of the composition disc makes for maximum tightness.

9. Is Demand Continuous Thus Favoring a Double-Seated Valve?

Continuous type operations should be handled with double-seated, semi-balanced valves. These valves are easier to control than single-seated valves and require less force to operate, making possible larger sizes and greater sensitivity. But as has been mentioned, double-seated valves are not suitable for intermittent service because they do not cut off the steam entirely when in the closed position. Temperature expansion will only permit one or the other of the tandem-connected seats to close tightly and, consequently, there will be a small leakage past the other seat.

Apparatus with continual steam demand is more usual in continuous rather than batch operations. Continuous pasteurizers, tunnel dryers, calendar rolls, paper and board machines, corrugators, continuous picklers, continuous plating tanks and reboilers of fractionating columns are familiar examples. Also in the continuous category are steam driven auxiliaries such as blowers, centrifugal pumps, centrifuges, etc.

Steam headers supplying a large number of batch-operated small presses, vulcanizers or retorts will have an aggregate total demand which make them a continuous-type application suitable for double-seated regulator valves.

Certain batch operations (usually where the demand side capacity is considerable) such as large kilns, dryers, bleachers, retorts, ovens and batch stills also can be successfully handled by double-seated, semi-balanced regulators, like the one in Fig 4.

The double-seated regulator is also excellent for building heating systems, low pressure and vapor-vacuum systems and for low pressure gas distribution systems.

Finally, double-seated regulators are entirely suitable for maintaining uniform supply pressure to final control valves . . . temperature, level and flow instrument controlled

valves. They are also recommended for the second stage of two-stage reducing stations.

In all the above mentioned uses of double-seated regulators, the small amount of leakage that takes place after the regulator has fully closed the valve is insignificant in normal operation and is taken care of by manual closing of a globe valve when the apparatus is not being operated.

10. What Inner Valve Guiding or Characterization is Needed?

Two factors are involved in the choice of inner valves for pressure regulators: (1) demand load variations, and (2) pressure drop across the valve. Table III gives general recommendations for various combinations of these two factors.

Very high pressure drop across the regulator valve introduces consideration of fluid dynamics and of erosive wear. For pressure drops exceeding 150 psi, top and bottom guiding of the inner valves is always necessary. Sometimes, in addition, a larger travel or lift of the inner valve is desirable to avoid wire-drawing and erosion.

In such service, the higher life V-port or solid contoured inner valves are preferable to the quick-opening poppet type. However, when only moderate load changes are involved, quick-opening inner valves may be used.

The second consideration, variation in demand load, requires an inner valve which will behave in about the same manner at all positions between open and closed. Inasmuch as the regulator will be called upon to deliver stable control at any one of many positions, the inner valve characteristic (valve travel versus flow) should be quite uniform.

Wide or extreme variations in demand load require pilot-operated regulators as indicated by the table. Wide demand variations also require some form of high lift inner valve. This combination will give smooth control under all operating conditions.

The pilot-operated regulator is necessary in order to translate a narrow pressure change in the medium being regulated to a wide air pressure change for the operation of the valve. This is readily accomplished by the throttling range adjustment which is available on the pilot-operated type but not on the self-operated type.

The high lift valve is necessary to utilize the wide range of air pressure throughout its full stroke and to translate air pressure into the desired flow characteristic.

Various flow characteristics are exhibited in the graph. In the table, only the quick-opening and equal percentage V-port and equal percentage contoured inner valves are shown. Between the quick-opening and the equal percentage types are two others, the true linear contoured and the modified linear V-port. The following summary covers preferred applications for all four types. The chart, Fig. 5, shows the characteristic curve of each type when inner valve travel or lift is plotted against flow.

Quick-opening inner valves:
- —where widely varying load demands are not present.
- —where rapid relieving capacity is needed.

True linear contoured inner valves:
- —where pressure drop of entire system is concentrated within the control valve.

Modified linear V-port inner valves:
- —where demand load variations require throttling range of 15 to 30 per cent.
- —on liquid services requiring a gradual closing to minimize hydraulic shock tendencies.

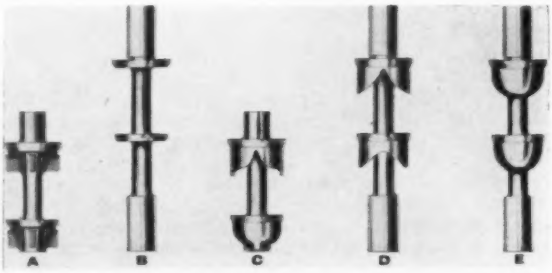
Equal percentage V-port or contoured inner valves:
- —where relatively long time lags and/or large de-

(Continued on page 244)

Table III. General recommendations for choice of inner valve depending upon demand load variations and pressure drop across valve. Illustrations of the various valves, referred by letter in the table, are presented below the table

	Demand Load Variations		
Valve pressure drop	Moderate. 2 to 20 per cent required throttling range	Wide. 2 to 50 per cent required throttling range	Extreme. 2 to 100 per cent throttling range
	Type of Regulator		
Making initial pressure minus downstream pressure	Self-operated or pilot-operated regulators	Pilot-operated regulators only	Pilot-operated regulators only
	Type of Inner Valve		
Moderate pressure drop (up to 150 psi)	Quick-opening, skirt-guided. See A below	Equal percentage, V-port, skirt guided. See C below	Equal percentage, V-port, top and bottom guided. See D below
High pressure drop (above 150 psi)	Quick-opening,[1] top and bottom guided. See B below	Equal percentage, V-port, top and bottom guided. See D below	Equal percentage, contoured, top and bottom guided. See E below

[1] Use of self-operated regulators on this service when accompanied by adverse storage capacity, may require V-port or contoured inner valve.



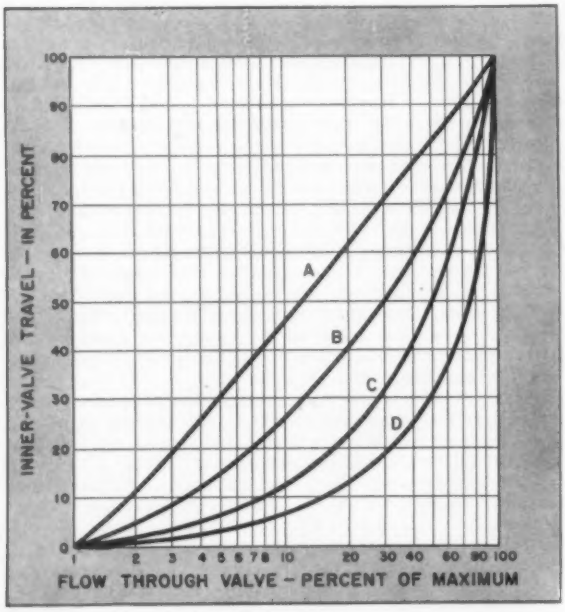
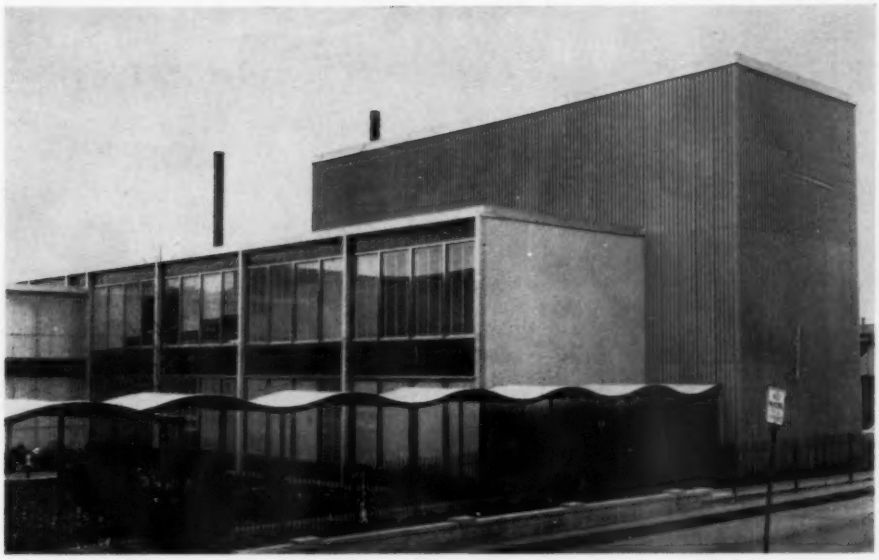


Fig. 5. This chart depicts general inner-valve characteristics based on constant pressure drop. The curves represent the following: A-Equal-percentage valve; B-Modified linear V-port; C-True linear contoured valve; D-Quick-opening



This is a partial exterior view of the "Showcase Building of Tomorrow," located at Ambridge, Pa., plant of H. H. Robertson Co. The cutaway drawing below shows one of the products employed in construction of the building, Q-Air Floor. This new product is said to speed up construction of the building and reduce ceiling-to-ceiling dimensions

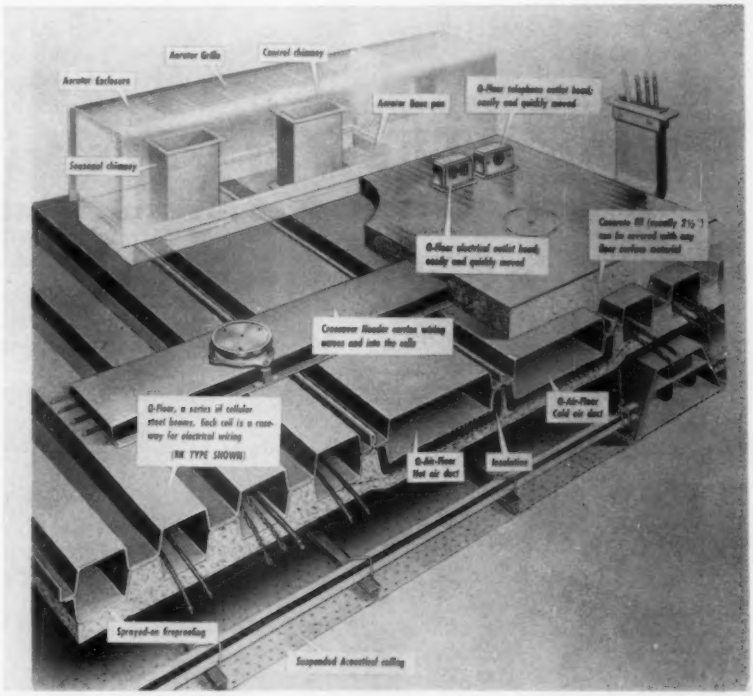
'Air Conditioning Floor' Cuts Space, Power Needs

THE "SHOWCASE OFFICE Building of the Future," recently displayed by H. H. Robertson Co. at its Ambridge, Pa., plant is well named. Constructed of all the Company's products both old and new, the building serves as offices for the 40-acre Robertson plant in that town.

Newest of the various products installed in the building is Q-Air Floor, called a new dimension to Q-Floor, a product developed by Robertson more than 25 years ago. Company executives pointed out that this new product is an air conditioning and heating distribution system with "real cost-saving features . . . as much as 5 per cent of the total cost of the building."

As shown in the accompanying wash drawing Q-Air Floor is a dual-duct high velocity system. By placing lateral secondary ductwork in the structural floor slab the ceiling-to-ceiling dimension of each floor is reduced 8 to 16 in. Therefore, it is pointed out, Q-Air Floor can permit a bonus of at least one extra floor in a typical 20-story building. This reflects a first-cost saving in foundations, footings, structural steel and wall-building materials.

In addition to this first-cost saving there is reported to be a yearly continuous saving for the life of the building because of reduced heating and cooling units and electric power needed for moving air throughout the building. This power savings is accomplished by a unique system of static pressure regulators that permit operating costs to be cut as much as 40 per cent because of reduction in power during off-peak. **End**


Aerator Grille
Aerator Enclosure
Aerator base pan
Q-Floor telephone outlet head; easily and quickly moved
Seasonal chimney
Q-Floor electrical outlet head; easily and quickly moved
Concrete fill (usually 2½") can be covered with any floor covering material
Crossover Header carries wiring across and into the cells
Q-Floor, a series of cellular steel beams. Each cell is a raceway for electrical wiring
(RK TYPE SHOWN)
Q-Air-Floor Cold air duct
Q-Air-Floor Hot air duct
Insulation
Sprayed-on fireproofing
Suspended Acoustical ceiling

This cut-away sketch of Q-Air Floor shows the relationship of Q-Air cells to the complete floor construction. Note that the air-cell portion of the flooring, in addition to the electrical raceway cells, make up the entire load-bearing floor

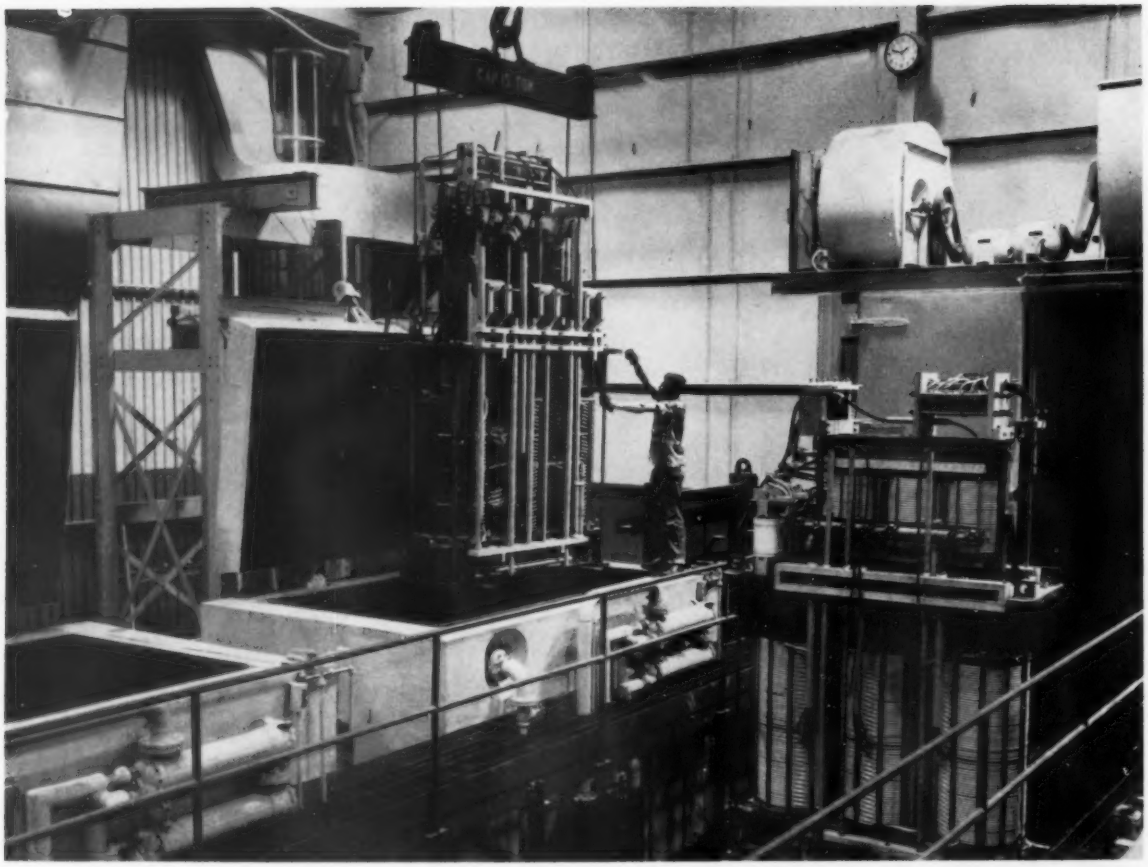


Fig. 1. Core and coil assembly suspended over drying tank; similar transformer equipment appears at the lower right

Drying "The Big Ones" in a Vacuum

Automatic System Removes Moisture Fast

By LEROY HUTZLER III, General Electric Co., Rome, Georgia

IN A SHORT SPAN of three years the Rome Medium Transformer Plant has established a reputation for prompt emergency service. In one case the plant delivered three transformers totalling twelve tons to a desperate customer in less than five days. A major factor contributing to this speed was a fully automatic vapor drying system.

Operating without attention this process contributes also to short non-emergency deliveries. While the plant functions on a normal work week, the treating system can be operated nights and weekends as well. Using a vapor heating principle, the system completes the transformer drying process in minimum time.

The vapor drying process utilizes the latent heat of condensation of oil vapor to heat a transformer rapidly while under vacuum. This permits the fastest practical removal of moisture from the insulation. A flow diagram is shown in Fig. 2.

In the Rome installation a single transformer assembly is placed in a treating tank. See Fig. 1. Vacuum is then drawn to provide a suitable boiling temperature for the heating oil. A hot oil vapor, generated in an outside boiler is introduced into the tank. The vapor condenses on all exposed surfaces of the transformer, rapidly transferring its latent heat to the colder unit.

A portion of this oil vapor, along with water vapor from the insulation, is drawn out of the tank and is condensed in a water-cooled condenser. The condensed oil and water pass through a decanter from which the oil at the top overflows to a tank receiver and thence returns to the boiler.

At the end of the heating, the treating tank and the units being dried are wet with vapor treat oil which has been condensing in the tank during this period. It is this

oil that we allow to drain back into the boiler before beginning our final drying cycle.

Since the system is at a temperature above the boiling point of water, any moisture in the system would be in the form of a vapor and would only leave this system by way of the vacuum line and the water-cooled condenser.

A cycle timer introduces dry air to reduce the vacuum partially, at regular intervals. Heat is maintained during this time by means of steam coils inside the vacuum tank. Airflow and heat speed the removal of volatiles from the system during this cycling. The oil vapor is condensed and returned via the decanter to be stored in the oil condensate receiver until the end of the treatment. Following this drying procedure the vacuum is broken and the transformer is removed for finishing and tanking.

Many unique features have been incorporated in the layout, all contributing to speed, flexibility and automation.

1. By using many small treating tanks the delay of accumulating batches is eliminated. A single core-and-coil assembly may be loaded into a tank and dried. Since the mass of the system is small, faster heating results.

2. By using an outside boiler a self-contained supply of vapor oil is provided. There are no delays for pumping oil in or out of the system. The tank is located above the boiler so that oil condensate can be returned by gravity rather than by pumping.

3. Total condensation of the water and oil vapors permits gravity separation of these materials. Thus the process is not slowed by water in the oil condensate which would be returned to the system and reboiled.

In addition to the above advantages, these layout features made possible a fully automatic process which requires an attendant principally for loading and unloading the treating tank. Process timers, sequence controls and other control devices provide a system which demands only three push-button or "dial-set" operations from the treat man. They are: 1. Set timer (dial-set). 2. Start vacuum pump (push-button). 3. Start process timer (push-button). By these operations the treat man starts a control system which without further attention from him will conduct the vapor drying process through all its phases. Then, after a signal indicating that the process is completed, the drying system is held under vacuum until the treat man is ready to unload the dry transformer.

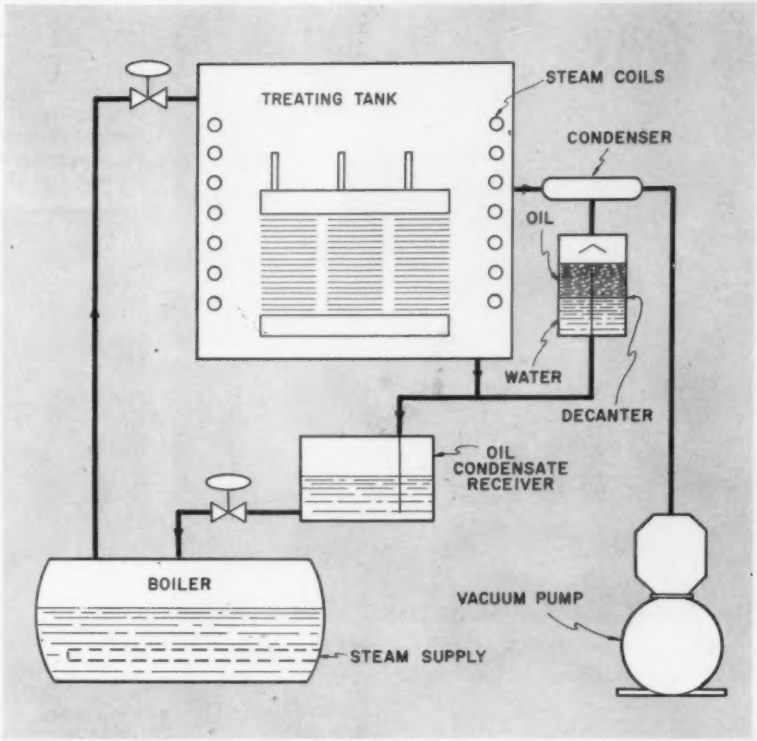
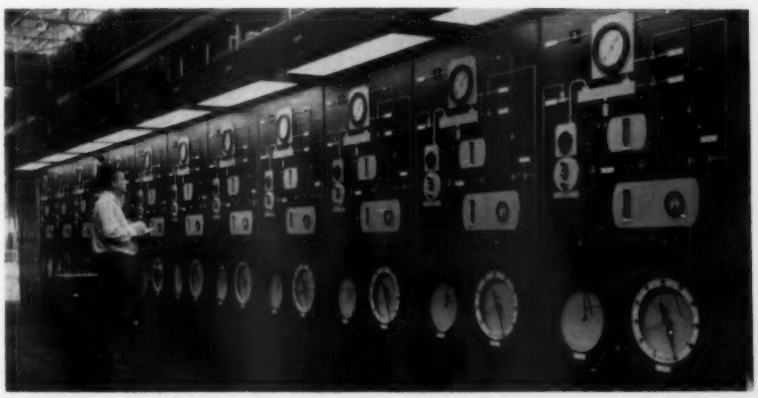


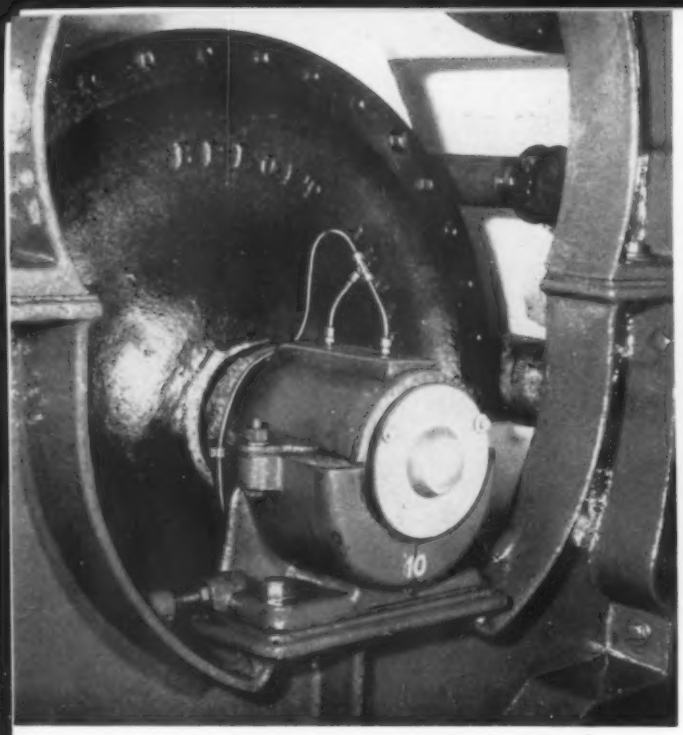
Fig. 2. Arrows in schematic diagram show direction of flow of oil and vapors

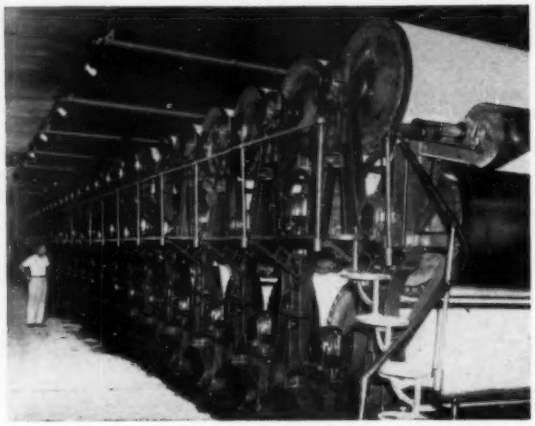
To protect the operation against failure of any function, a number of safety interlocks and alarm controls have been provided. Thus, if the transformer fails to reach drying temperature before the end of the vapor cycle time, a controller will extend this period. In case of other failures, either utility shutdown, or mechanical or electrical breakdown, the process is halted until service can be obtained. Any potential treating hazards are signalled by an annunciator system.

Automatic controls have provided means for process operation through nights and weekends without attendance. In combination with the equipment design and layout, these features have reduced transformer drying cycles to half the best previous cycles. **End**

Fig. 3. Process gages, recorders are connected graphically on control panels







Figs. 1 and 2. The aerosol lubrication system has been installed on dryers of the St. Regis Paper Company. Close-up view, left, shows how lubricant is applied to bearings. Overall view of dryer is shown below. Results are consistent, uniform lubrication, bearing temperatures reduced 8 to 10 F and, in addition, less lubricant is used

Aerosol Lubrication—

It Is Solving Many Industrial Lube Problems. Can It Help You?

WITH PLANT equipment being operated at fast speeds and for long periods, industry is always looking for new lubricating methods to take care of this equipment. One method, developed in recent years, that of applying an aerosol of lubricant, is being used by a number of industrial plants for their machine tools. In addition, the system is widely used for air tools and other air operated equipment.

Here are some facts about this system, along with actual case histories, to help you determine where it could be used in your plant.

A feature of this aerosol lubrication system, developed by C. A. Norgren Company, is that the oil particles of only two microns (0.00007874 in.) diameter and less are like so much "dry smoke" in the air lines and can be conveyed long distances through complex piping systems, if necessary, with very little reclassification or condensation.

At the bearing or other part to be lubricated, a reclassifier, or nozzle-like fitting, causes these small particles to combine into larger particles, forming a fine spray that impinges upon the bearing or gear to be lubricated and "wets" it thoroughly with a protective film of clean oil.

Characteristics of System

With this oil-fog system a single lubricator can automatically deliver enough air-borne lubricant, appropriately distributed to all lubrication points, to furnish complete lubrication for all bearings, gears, etc., on even a large machine. The system can be manifolded the full length of a machine and meters the appropriate amount of lubricant to each lubrication point. Some lubrication systems require expensive, high-pressure piping to handle lubricants under pressures from 2000 to 3000 psi, while pressure in this type of lubrication system is less than 10 psi.

Consider for a moment the fundamentals of lubricating a bearing, whether plain or anti-friction. The only oil that actually lubricates the bearing at any moment is the thin film that separates the metal surfaces. Any additional lubricant is a waste and may even be harmful, causing over-heating due to fluid friction. For example, a bearing operating at high speed completely submerged in a lubricant bath would generate a considerable amount of heat as a result of fluid friction, raising the temperature of the bearing and reducing its useful life.

The aerosol lubrication system automatically and continuously meters a small amount of lubricant into the bearings, coating them with a protective film of fresh oil. Just the right amount of oil—no more, no less—is continuously applied. There are never periods of too much

or too little lubrication. The oil feed is visible, furnishing proof every minute that the lubricator is functioning.

Since the lubricant is air-borne, the air conveying the lubricant expands as it enters the bearing housing, and provides a cooling effect that reduces bearing temperatures. It also provides a slight positive pressure within the bearing housing. The continuous flow of air through the bearing reduces the entry of dust, coolants, fumes and other abrasive foreign material.

Because there is a positive air pressure within the bearing and because there is no excess of lubricant with this method, oil seals are not usually required. Even when seals are left in place, the maintenance they require is negligible. Thus, this system substantially reduces seal maintenance and replacement costs.

An important point to remember is that the oil injected into the bearing is always clean and fresh. It is never re-used or re-circulated. There is no need for oil pumps or elaborate oil filtering systems and for the maintenance which they require. The bearing gets all the advantages of a continuous supply of clean, fresh lubricant with its original lubricating quality.

Generally speaking, the lubricating oil used in this system can be of a lower viscosity than for other types of lubrication systems. This is possible mainly because this system applies only a small amount of oil to the bearings, and there is less fluid friction to develop heat. Consequently, the bearing runs cooler and a lower viscosity oil does the job.

Let's take a look at a few typical applications and see what it is actually doing in industry.

Industrial Applications

Dryer equipment at the St. Regis Paper Co., Pensacola, Florida, had been a number one lubrication headache for many years. The rolls on the 100 ft long dryer are in three tiers and operate at 225 to 235° F and at 7 to 16 rpm. A block grease lubrication system was originally used to lubricate the 174 bearings for the dryer rolls.

Fig. 3. Laboratory equipment demonstrates how air-borne lubricant is generated

However, constant attention was needed in order to supply a bare minimum of the lubrication that was required. Oil had to be added to each bearing periodically with an oil can to make up for the inadequate lubrication supplied. The grease blocks had to be replaced. And, occasionally the oil-grease mixture would work out of the bearings and cause costly losses of paper stock.

After testing the aerosol lubrication system, comparing it with other systems of lubrication on both plain and anti-friction bearings, St. Regis has adopted it for the complete lubrication of all 174 bearings on the dryer sections, Figs. 1 and 2.

Their tests showed them that: (1) The application of oil was consistent and uniform throughout the bearing system. (2) Maintenance of the lubrication system is simpler —close attention is no longer necessary and supplementary hand lubrication has been eliminated. (3) Bearing temperatures have been reduced 8 to 10 F. (4) No sign of oil oxidation, and the bearings remain bright and clean. (5) Less lubricant is consumed, eliminating the frequent oil changes due to discoloration and the plastic-like formation substance. (6) Paper spoilage due to leaking of excess lubricant has been ended. (7) Dust, dirt, lint and other foreign materials are excluded from the bearings by the positive air pressure in the bearing housings.

An automotive electrical equipment manufacturer had a problem with one of their automatic screw machines which has a speed of 3000 rpm. Originally, the machine was using approximately 15 gal of oil a day. There was considerable oil loss due to splashing and leaking from bearings. While the machine was being overhauled, the user converted to the aerosol method of lubrication for all machine parts—sleeve bearings, anti-friction bearings, slide blocks, guides, the chucking mechanism and the gears.

The improvements effected by the installation were (1) Only one half pint of oil per day does the job formerly handled by 15 gal of oil.

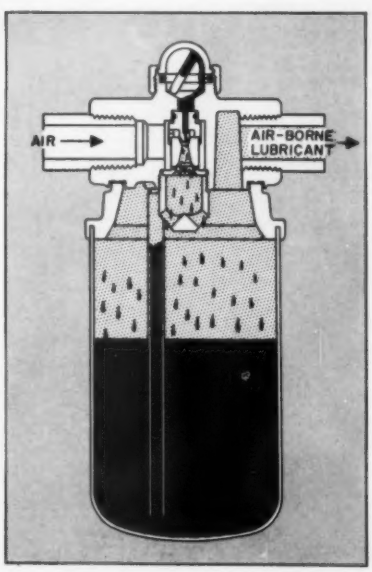


Fig. 4. Only smaller oil particles are carried to equipment to be lubricated

(2) Life of the bronze slide blocks has been increased. (3) Less maintenance is now required for the machine.

Another application is on an 80-ft Cross Transfer-Matic, Fig. 5. This machine is used in the engine plant of an automobile manufacturer to machine V-8 engine blocks at a rate of 80 an hour. Two aerosol lubricators, one mounted on each side of the machine, lubricate 350 ball bearings and 170 spur gears in the multiple spindle heads.

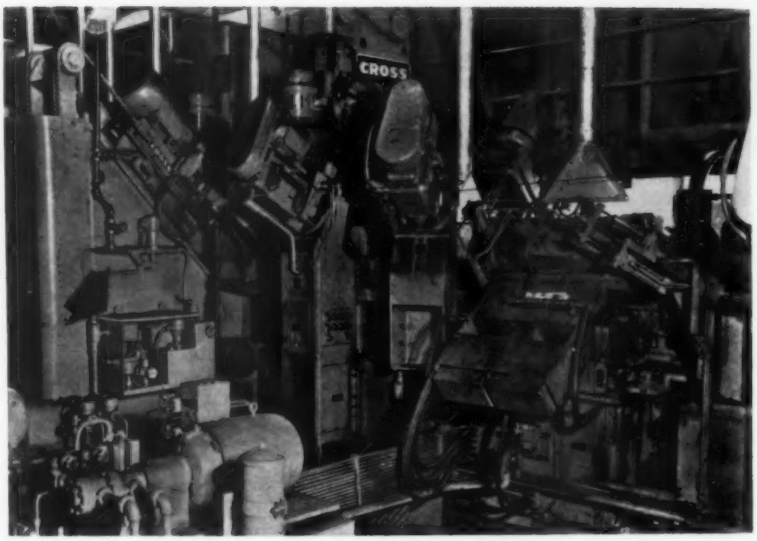


Fig. 5. This 80-ft long Cross Transfer-Matic, which machines V-8 engine blocks in an auto manufacturing plant, is equipped with an aerosol lube system, arrow

Warning Signals

These aerosol lubricators are equipped with pressure switches and controls to flash automatic warning signals on the control panel of the machine when the oil supply needs replenishing, if air pressure fails or if excessive pressure develops in the oil reservoir. A solenoid valve starts and stops delivery of the lubricant when the machine is turned on and off.

With so many sources of heat generation on a machine of this type, the aerosol method of lubrication is a big factor in holding the operating temperature at only slightly higher than room temperature. This is accomplished through the cooling qualities of the air-borne lubrication. This system also reduces the need for bearing and gear box seals on this machine.

An automotive equipment manufacturer was having trouble with rejects in milling slots in cast iron distributor housings. Mill and power heads of the machine were packed in grease and ran so hot after one hour's operation that guide rods expanded, causing dimensional inaccuracies.

An aerosol lubrication system was installed for the bearings and gears in the mill and power heads. The heat problem was solved. In fact, after eight hours of continuous operation, the heads operate at slightly above room temperature. Milling accuracy is also improved—with fewer rejects.

Acid fumes from plating tanks at Wagner Electric Corp. created a costly problem in the lubrication of gear drives that agitate wire baskets loaded with parts. Fumes would drift into the gear housings and contaminate the lubricant fed from drip oilers. In attempting to regulate the drip flow, gears either heated up and wore excessively from not enough lubrication or, when oil flow was increased, foaming and sludging of lubricant resulted and gears ran hot and corroded.

The problem was solved by using the aerosol spray method of lubrication, Fig. 6. The slight air pressure which was maintained in the gear housing kept the acid fumes out and the lubricant does its job. Frequent attention to this lubrication job ended—so did the oil seal repair and replacement because seals were no longer needed. Gear wear has been reduced. **End**

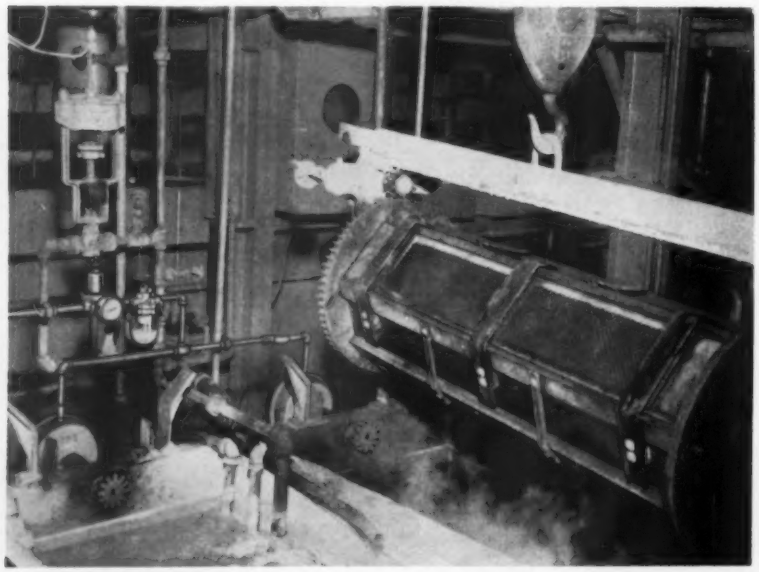


Fig. 6. Lube system solved problems on plating tanks at Wagner Electric Corp. It has ended lubricant contamination, corrosion of gears and gear box seal failures

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Flow Measurement

Meter Types and Selection Considerations

By **CHESTER S. BEARD**, Chief Engineer, Control Valve and Actuator Div., General Controls Co.

LARGE PERCENTAGE of our measurement needs will indicate the orifice or displacement meter but if the classification, "differential" is substituted for "orifice", the variety of types of those seemingly simple approaches is increased appreciably.

Before a selection can be made, a resumé of methods of measurement is necessary. The differential method is accomplished by installing a restriction in a closed pipe. A coefficient may be calculated with due consideration of the physical characteristics of the flowing fluid so that the square root of the differential pressure caused by this restriction times this coefficient is the rate of flow. This statement surely oversimplifies the problem, but is sufficient for our considerations. The simplest and most widely used restriction is the sharp-edged concentric orifice. Other types include the eccentric and segmental orifice, flow nozzle, Foster flow tube, and venturi tube. See Fig. 1.

Extensive tests have been run and standard calculation methods set up for use of the concentric orifice. Nevertheless, it has limitations as to use. Sludges, or solid matter in the flowing fluid will build up behind the plate causing inaccuracies when high velocities, conditions conducive to erosion or corrosion are indicated, or necessity for low permanent pressure loss is required.

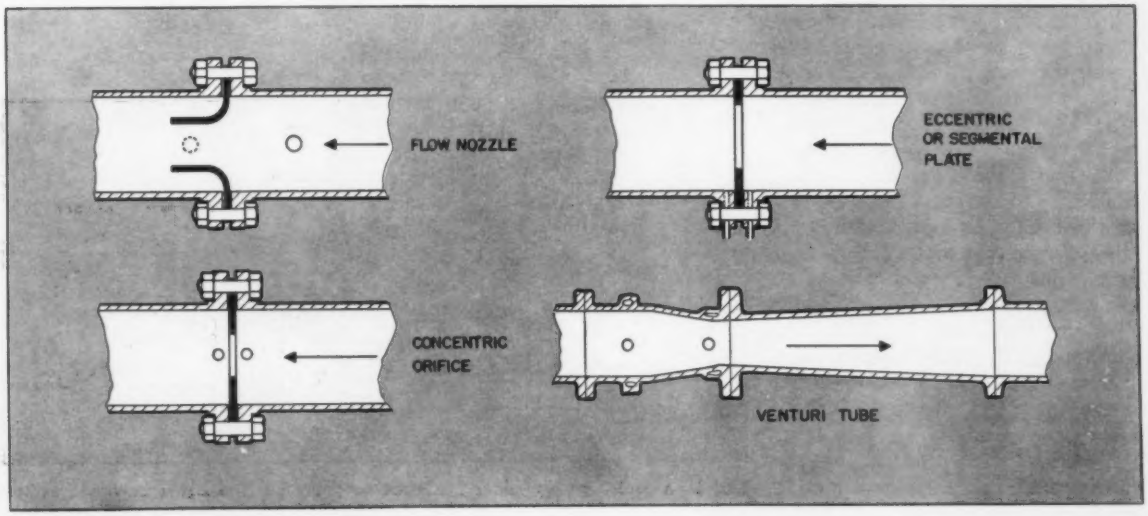
Most differential creating devices require enough straight run of pipe before the upstream pressure tap is reached to obtain a flow without permanent eddies or cross currents. This distance may be decreased by use of straightening vanes similar to a nest of smaller diameter tubes. The length of pipe on the downstream side of the primary element must be sufficient to allow the static pressure to return to the maximum which it can attain.

Depending upon the piping configuration before the metering run, the ratio between the pipe diameter and flow orifice diameter, and the type of primary device, the required length of pipe ahead of the primary device could be as great as 45 times the metering run diameter. The required downstream pipe length could be as much as 8 diameters. It can be seen that for pipe sizes of even 6 in. this requirement becomes a space problem as well as an economical consideration. Use of straightening vanes can decrease the requirements to 10 diameters upstream and 3 downstream.

Two differential primary elements, the Gentili flow tube and Dahl tube, are devices which may be calibrated for short approach or even 90-deg approach fittings. This decreases the piping necessary for installation. See Fig. 2.

Liquid displacement meters consist of rotating discs, oscillating compartments or pistons. In each type, the element is cycled by flow of fluid through the meter. During each cycle a constant increment of vol-

Fig. 1. Four different types of restrictions that can be placed in a pipeline for the purpose of measuring fluid flow



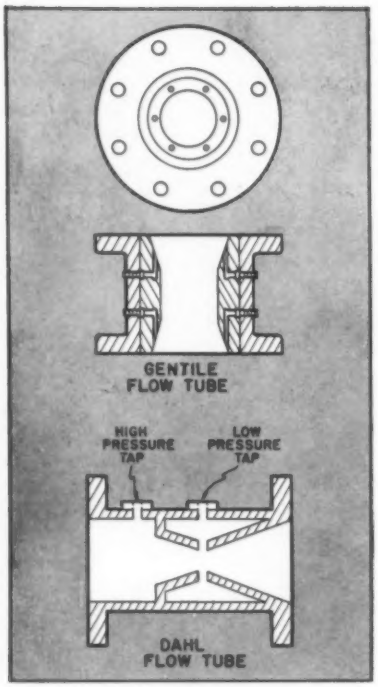


Fig. 2. These cross sections represent flow tubes that can be calibrated for short approaches and 90 deg fittings

ume is discharged and counted on a digital dial. This type of meter has the advantages of high accuracy over wide range of flow within the capacity of the meter; it is practically unaffected by changes in flow, density, viscosity or pressure, and conditions of installation are not difficult or critical. On the disadvantage side of the ledger, it has capacity limitations due to size, requires relatively clean fluid free of vapors, and must be calibrated relatively frequently for highest accuracy.

Gas displacement meters accomplish the same incremental measurement using diaphragm material to create the compartments. See Fig. 3. Correct determination of gas volume passed by this type of meter requires a correction for pressure, temperature and specific gravity.

These corrections may be integrated into the meter reading. If they remain constant, factors may be applied to the total reading or the meter may be calibrated under operating conditions.

Film-sealed rotary meters pass increments of volume by movement of rotors. The capacity of these meters is very high. See Fig. 4.

Rotation of a propeller by the flowing fluid in the same manner as in the anemometer, may be calibrated to measure flow. This rotation may be translated into an accumulated flow indication through gearing between the propeller in the line and the counter outside.

A more recent adaptation of this method counts the rotor rotations electrically. Pulses, caused by the blades of the turbine cutting a flux field to affect a magnetic pickup, are indicated or recorded on a frequency or pulse counting meter. This system has the extreme advantage that the line may be effectively sealed because no moving parts must be brought out from the rotor. The unit must be calibrated and this calibration related to flowing conditions. See Fig. 5.

The variable area meter (rotameter) consists of a calibrated tapered tube containing a float. The weight of the float is such that it may be positioned by the flow of fluid through the tube. The buoyancy affect or pressure differential required to lift the float is a constant value so the float rises with increased flow to keep the differential constant by changing the annular space between the float and the tapered tube. Rotameters are being made in numerous forms and at least up to 16-in. size.

Advantages of this type of measurement include ability to measure corrosive liquids. Position and operation of float are visible through a glass tube. Uniform accuracy throughout the calibrated range plus uniformly graduated scale rather than one employing square root calibrations, contribute to greater rangeability. The pressure drop is the same throughout the range.

Although piping may be slightly more complicated, no straight meter run is required. Most of the disadvantages of earlier types have been eliminated. As is the case with all precise equipment, the correct unit selection must be based upon manufacturers' recommendations for pressure, and temperature involved, sludges or varying viscosities and capacity.

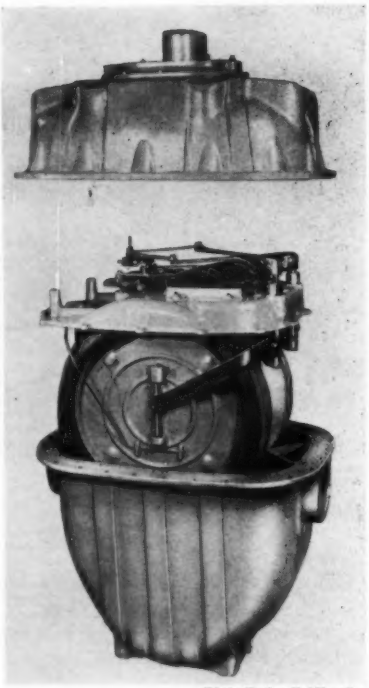


Photo Rockwell Mfg. Co.

Fig. 3. Exploded view of a gas meter shows some of the linkage between a valve and one of the diaphragm discs

Measurement engineers are on a continuing quest for a metering device that, at a facetious ultimate, would give a reading by merely pointing the unit at a pipe. So far, this is not available, but metering

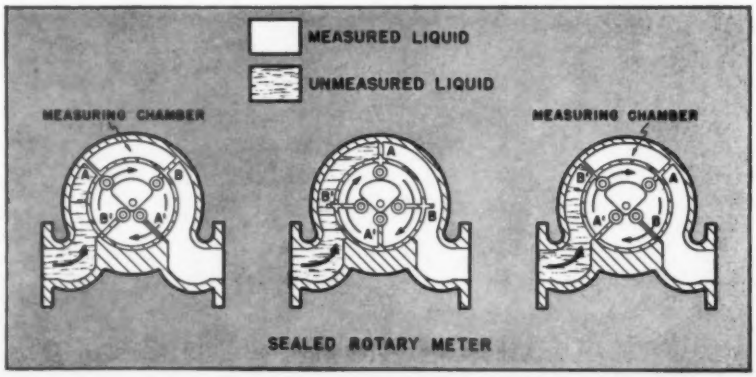


Fig. 4. A sealed rotary meter is similar to pump but the liquid moves the rotor

devices are available, for a fee, which require no obstruction in the flow stream. Velocity of flow of many fluids may be determined by measuring the effect of flow upon a magnetic field imposed upon the flow stream.

Flow has been successfully measured by calibrating the difference in time required for a high frequency signal to pass diagonally upstream between two points and downstream the same distance. Commercial units are available although these have certain limitations as to kind of fluid, pipe size, and pipe material. A similar approach uses high frequency sound waves traversing the flow stream.

As a guide to selection of a metering device, the following questions are presented: 1. Is instantaneous rate of flow important? 2. Is the total flow which occurs during the time between readings, the information desired? 3. Is it important to have a recording of the flow pattern throughout the period of measurement?

4. How constant are the physical and chemical characteristics of the product to be measured? This must be determined to decide what method must be used in applying corrections to the reading which indicates the flow rate.

5. Do the variations in flowing conditions warrant the expense and complication of continuous measurement and integration?

6. What permanent loss in pressure is acceptable? 7. Do the corrosive effects of the flowing fluid require special consideration? 8. Does the flowing fluid contain solid matter which would preclude use of certain meters?

9. Do any of the peculiar properties of the flowing fluid require one of the obstructionless or sealed-in measuring elements? 10. Will the information be transmitted to a remotely located board?

11. Will the readings of the primary device be fed to a data logging or computing system? Differential or velocity values may be translated readily into the electrical form required for this use.

12. What type of primary device will contribute to economical piping and fit space available? 13. Will the primary element operate under the temperatures and pressures existing? 14. Will the primary element handle the maximum flow and range of flow required? 15. Is the accuracy of measurement acceptable?

16. Can the metering device be installed as required? Rotameters require vertical installation; displacement meters normally horizontal, while others have no limitations.

Problems of measurement and control of products such as liquid sodium, radioactive liquids and other fluids required by nuclear energy installations are complicating measurement methods. Fortunately, the problems are recognized and methods are being evolved by revision of existing devices and development of new.

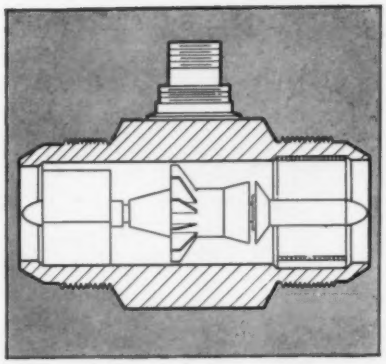


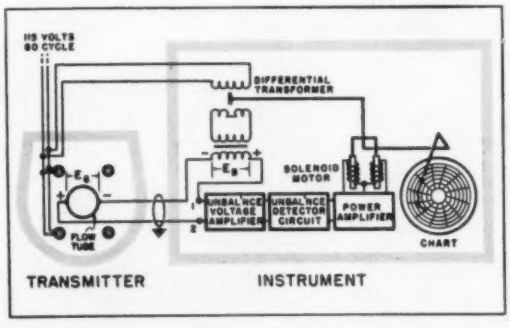
Fig. 5. Magnetic pickup turbine meter

Refinement of "old standby" methods is continuing so that the equipment is becoming more accurate. Most measuring units are now designed to allow remote transmission and transducers are available to adapt outputs to many forms of computation and integration. It may seem that the problem of selection lies in the availability of too many alternates. This would be true except that a very large percentage of the applications may be very ably handled by a form of differential or displacement meter. **End**

Theory of Operation of a Magnetic Flow Meter

There is a two-wire cable from the power line to the transmitter carrying the 115-v, 60 cy power for the magnet. This same power line is extended to the instrument.

In addition, a two-wire shielded cable carries the generated voltage from the transmitter to the instrument. The generated voltage is connected in series opposition to a differential transformer unit which is mounted in the front of the instrument case and linked to the drive shaft of the drive balancing unit.



When a condition of null balance exists, the sum of the voltages from point 1 to point 2 around the circuit is zero. If a change in flow occurs, the voltage E_G generated by the transmitter will be different from voltage E_B produced by the differential transformer unit. This causes a net voltage to appear at the amplifier input.

This amplified voltage is compared in phase with the line voltage at the unbalance detector circuit to determine whether the flow has increased or decreased. The output of the unbalance detector circuit is two d-c voltages opposite in polarity.

These voltages are of equal value when the instrument is at null balance and they are of unequal value whenever the flow increases or decreases.

Both the differential transformer and the flow transmitter are supplied from the same source of power. This allows line voltage changes of ±10 per cent with no effect upon the instrument calibration since both the generated and balancing voltages change in unison.

(Courtesy of the Foxboro Co., Foxboro, Mass.)

Signals selected at desk go to remote points where relays actuate functions. Return signals indicate performance

Flying Signals Control Remote Pumps

Microwave Radio System 20 Per Cent Cheaper Than Pole Line

REMOTE CONTROL pumping operations, made possible by microwave radio, is helping the Olin Mathieson Chemical Corporation, East Alton, Ill., pump up to six million gallons of water daily from the Mississippi River to the firm's filtration plant three and one-half pipeline miles away. Utilizing tones transmitted by high frequency radio energy, the microwave system provides supervisory control of pumps and helps to control the flow of water reaching the filtration plant.

The control function has been engineered to the point where immediate re-supply action takes place on the river bank when any measurable amount of water is consumed by any of the corporation's operating components.

There is no reservoir for filtered water at the plant so pump operation goes on 24 hours a day, seven days a week. If there should be an interruption in the water supply of as much as half hour, production would be curtailed. The water is used at the plant mainly for cooling purposes, washing components with acids and clear water baths.

The idea of using microwave to control the pumps was originated by the company's electrical engineers when it became necessary to replace wire-line control cables which had been used for 15 years. Maintenance on the wire-line was laborious because electricians had to walk the entire length of the wires, zig-zagging through three and one-half miles, including about a mile of heavy woods, to make certain the system worked properly. Poles for the line, being near the flood area of the river, were vulnerable to the weather.

Early inquiries regarding microwave equipment made it apparent that maintenance would be necessary only at two locations. All of the troublesome maintenance of lines and poles would be eliminated. This control problem was turned over to General Electric Communication Products Department who obtained a license from the Federal Communication Commission to permit operation of the system.

Plant Engineer, V. H. Unterbrink, estimates that microwave was 20 per cent cheaper on original costs than the amount which would have been necessary for construction of a cable-type control.

An important consideration in the installation, was that future cost of rehabilitating the microwave equipment will be lower than other control methods. Microwave towers will stand much longer than the 15-year life of the poles and only

relatively small parts will have to be replaced from time to time in the system itself.

Only two towers are used in this system. The microwaves travel in line-of-sight paths through the air between large metal discs at the top of the towers and do not have to travel a zig-zag path following the terrain of the land underneath. As a result, the microwave distance involves only 1.9 miles of transmission, as compared to three and one-half miles formerly required for cable control.

On-and-off switching of the motor-driven water pumps is done by remote control from the dispatch terminal. An indicator light denotes any changes taking place at the remote station. A two-way voice circuit is also provided to facilitate maintenance of the equipment.

General Electric tone equipment provides the control for switching, indicating and telephone ringing. The microwave equipment provides the communication medium between the dispatch and remote terminals and is the means by which tone and voice messages are transmitted. Standby microwave devices, with automatic switching, assures increased system reliability.

Tone signals selected at the desk-mounted console at the dispatch terminal are applied to the microwave equipment and go to the remote points where relays actuate the desired mechanical pumping functions. As the desired functions are completed, return tone signals turn on the indicator lamps at the dispatch center showing the task has been performed properly.

Any change in pump conditions is shown automatically on the supervisory control panel. An uninitiated change activates an alarm calling the operators attention to an unusual condition. **End**

Microwave relay tower at plant is designed to withstand severe weather

Tone signals received at river pumping stations operate the motor starters, at left. If a pump stops without a command to do so, alarm rings in the dispatch terminal

Motors on water pumps at river bank are controlled by microwave tone signals to keep supply ahead of the widely varying demands for water made by the plants

Fig. 1. Use of telescopic-type fork truck permits easy maneuverability in raw material storage area where three rows of racks are tightly spaced

Making the Most of Plant Space

Materials Handling Ideas Help Fit Each Piece in Place

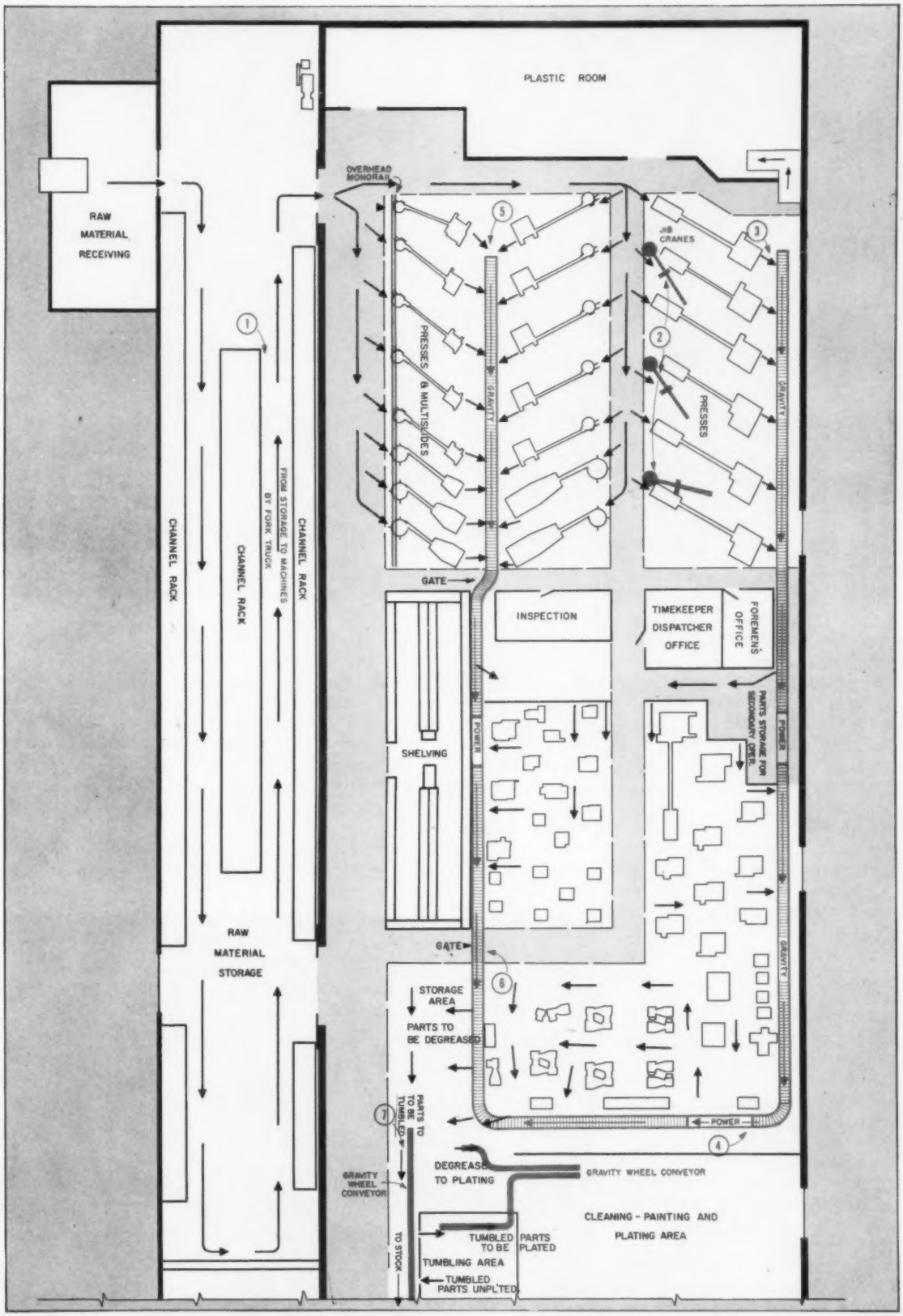
By HOWARD T. OSETH, Plant Engineer, Appliance Control Dept., General Electric Co., Morrison, Illinois

MATERIALS HANDLING can be a smooth flowing, orderly process — an aid to manufacturing. However, in a job shop punch pressroom, materials handling is usually an uncared for stepchild that proves to be a delinquent of major significance. Priorities and the constantly changing setup required for each lot progresses to the natural conclusion of lost batches of material, fouled up schedules, and the resulting build up of inventories.

At General Electric's Appliance Control Department in Morrison, Illinois, we have been given this difficult stepchild — materials handling—some much deserved attention. Our results to date have been significant. The present arrangement has enabled the department to cut lead time, keep track of job lots with a minimum of "parts chasing," and by virtue of a systematic flow, reduce inventories.

The materials handling problem for a job lot pressroom has many facets: floor space is always at a premium, the multitude of parts require numerous punch press and varying amounts of machine operations, and at Appliance Control, virtually every metal part receives some type of electroplate or paint finish. This was a very real problem for us, but we have come up with a solution that has improved our operations greatly.

Our materials handling system starts with our raw material storage area. Here, coil stock of more than 20 different material specifications, including over 600 sizes, is pallet stacked in three rows of tightly spaced metal storage racks by a telescopic-type fork truck, Fig. 1. This truck is ideal for this application since it can easily maneuver



With floor space at a premium each piece of equipment in 170 by 80 ft pressroom fits in place like parts of a jig-saw puzzle. Numbers identify at what point illustrations were taken. Handling equipment is shown in color

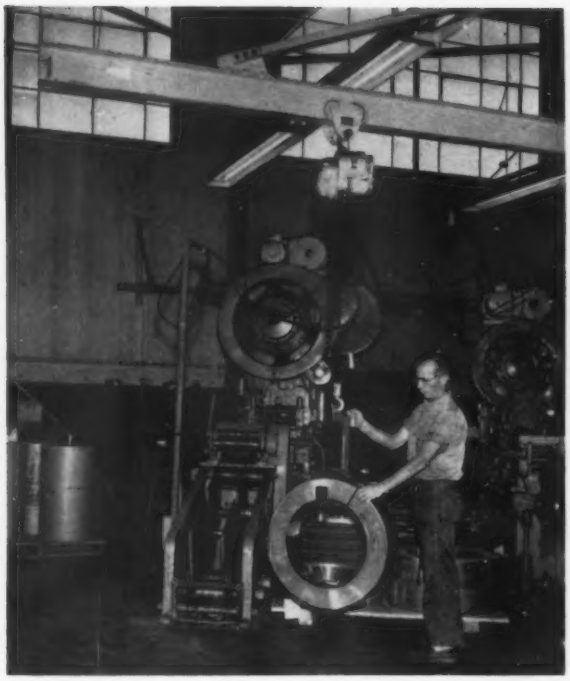


Fig. 2. Three jib cranes, located near the primary presses, enable operators to load coil cradle without additional help

Fig. 3. Roller conveyor was placed next to wall to receive parts. From here, they are moved to secondary storage area

its load in the 6½-ft wide aisles between the coil storage racks. Coils of raw stock are delivered from the stock room directly to the coil cradles feeding the primary punch press for the first operation or operations on progressive dies in making the required part.

To load the coil stock into the cradles of our primary presses (45 to 100 ton), we have installed three 1000-lb capacity jib cranes over the aisle between the presses. With these jib cranes the press operators, without having to wait for help, can readily load the coil cradle feeding their own presses, Fig. 2. One row of primary presses (12 to 45 ton) has a monorail and chain hoists to load their cradles.

We located all of our primary presses on an angle to the aisle to achieve maximum utilization of our ever increasing floor space requirements (see layout). The primary presses are located in an area of only 4830 sq ft, which includes an aisle 6-ft wide running the length of the area.

Parts processed on the six primary presses located closest to the outside building wall are placed in tote pans on a roller conveyor located adjacent to the wall, Fig. 3, and by gravity travel to our secondary storage area. This conveyor passes a pick off point at the secondary press storage area, which permits one of the men to remove those parts requiring secondary press operations.

Upon completion of the final fabrication operation by one of the secondary presses (20 to 80 ton), parts are put back on the conveyor by the outside building wall and travel in a straight line for the remainder of the 150 ft to the end of the secondary press area (see layout).

Here a 90-degree angle turn in the roller conveyor, Fig. 4, brings the parts in process past 55 ft of work stations. At these positions hobbing, drilling and tapping operations are performed as specified in part drawings. Upon completion of these operations, the parts are again placed back on the same roller conveyor and delivered, still by

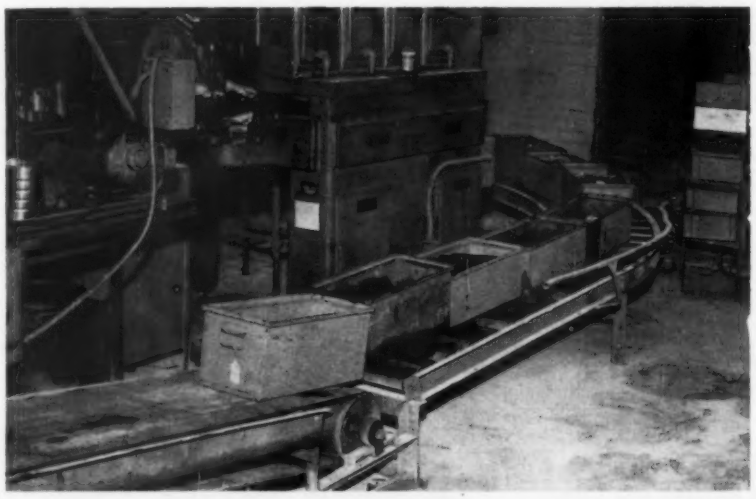
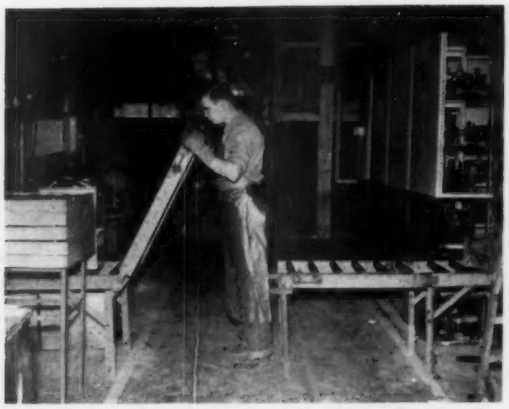
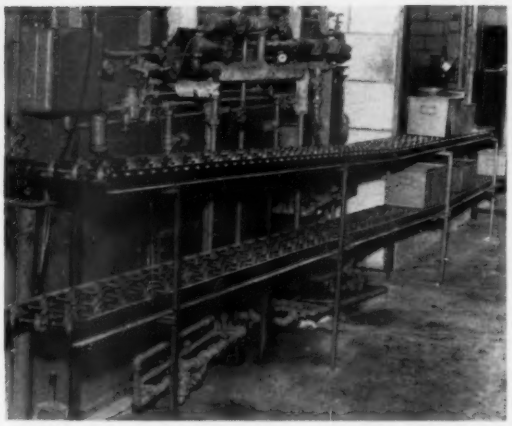


Fig. 4. This is one of the two 90-degree angle turns in the conveyor. At this point, parts are moved to work stations for hobbing, drilling and tapping operations





Figs. 5, 6 and 7. Fig. 5. Above: A second conveyor line runs between two rows of primary presses. Fig. 6. Upper right: Because of tight space, one conveyor crosses two aisles. Special gates were installed at these points to permit aisle traffic. Fig. 7. Right: Two-level conveyor carries parts to deburring station or final inspection

gravity flow, to the degreasing area. At the end of this run the conveyor has a second 90-degree turn and joins the conveyor carrying parts from other primary punch presses (see layout).

The second conveyor line runs between two rows of primary presses (12 to 45 ton), Fig. 5. It serves the primary presses as well as secondary operation presses (4 to 30 ton) located on the interior side of the pressroom. The maximum distance from any press to either this conveyor run or the section described above is 20 ft, those presses processing the heavier work being located closest to the conveyor. As materials handling is never static, and improvements are always possible, our next step is to install feeding conveyors from the presses to the main conveyor.

The roller conveyor, although 20 ft from the nearest wall, crosses only two aisles in its 150 ft of travel. These two aisles are closed only long enough to allow accumulated tote pans to pass, after which the hinged section of conveyor is again folded back and opens the aisle to normal traffic, Fig. 6.

Two sections of conveyor are joined—as stated above—with a 90-degree turn to allow parts to travel to and return from the work stations for hobbing, drilling and tapping operations, if required. At this turn in the conveyor we have set aside a storage area for degreasing. Here, each lot of parts is cleaned prior to plating or painting.

Two-Level Conveyor

After degreasing, a two-level gravity conveyor carries, on the lower level, aluminum or other parts not requiring further processing another 70 ft directly to final inspection and on to finished parts storage, Fig. 7.

On the top level of this two-level conveyor, parts travel 30 ft to tumbling barrels for deburring, and continue on the same conveyor to final inspection and finished parts storage, or an additional 18 ft to the plating room. For parts that are plated or painted directly after being degreased, a separate conveyor is provided that transports parts directly into the plating and painting area, a distance of 17 ft.

Actually, the basic conveyor layout forms a large "U" shape, 150-ft long and 55-ft wide that provides materials handling facilities for all of our fabrication equipment. Then at one bend in the "U" we have established a storage point and a second series of conveyors leading to further processing and finished parts storage. **End**

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Floor On Floor Supports Load

Fig. 1. Workman places fir plywood panel over steel joists during floor remodeling. Flooring system boosted live load rating from about 70 to 200 psf

SPECIAL FLOORING technique has helped solve a heavy loading problem in a remodeled building for the Pacific Telephone and Telegraph Company.

Fig. 2. Each of the flooring panels is first backed with 16-gage sheet metal

Floors in the building were not considered strong enough to support the battery of IBM machines that the company planned to install in its new data-processing room. The room was an L-shaped space occupying about 2,500 sq ft and is located on the seventh floor. The conventional load limit for an office building of this type is in the neighborhood of 70 psf.

By using the new floor system, the contractor, Arras and Son, was able to boost the live load rating to 200 psf. The new flooring arrangement permits a concentrated load of up to 1,000 lb per machine leg to be transmitted to the floor through large rubber casters resting on steel floor plates.

In this system, the columns of the building, spaced about 20 ft apart, become the main load-bearing members. Composite eight-inch I beams were secured to the building columns. Floating steel joists on 16-in. centers were placed on top of the beams.

Fir plywood panels were installed over the steel joists. Instead of installing the plywood in standard 4 by 8-ft panels, the sections were laid in 2 by 4-ft panels.

These panels are removable and interchangeable. However, the plywood panels around the perimeter of the room are fixed. More than 200 individual panels were installed. The underside of each panel is first backed with 16-gage sheet metal which is secured with waterproof glue and six screws.

Panels had to fit precise measurements, because they were to be covered with foot-square, one-eighth-inch rubber tile. Edges of the panels that did not fit precisely were gone over with a hand grinder.

Each panel was drilled at the four corners with quarter-inch holes. After each panel was in place, joist flanges were drilled and tapped through the holes in the plywood to take zinc-plated bolts and washers.

Another reason for such precise fitting was that the space under the floor was a pressure chamber for cool air. The cool air is pumped into the underfloor area, used for cooling the IBM equipment, and then sucked up into ceiling-mounted exhausts. **End**

Plastic Paints—

Where They Can Be Used, How To Prepare Surface and How They're Applied

WATER-THINNED latex paints have moved out of the parlor and into the plant. Once the standby of the do-it-yourself home painter, these paints have become the utility infielder of the plant maintenance crew. Their usefulness comes from their versatility, ease of application and ruggedness under varied plant conditions.

While the early butadiene-styrene latex paints were highly popular for home use, they lacked some properties needed for industrial service. Because the performance of a paint depends a great deal on its binder, the chemical industry set about developing better binders to improve the performance of water-thinned paints while retaining the basic advantages of water thinning.

The basic objectives were to (1) reduce recoating time to an hour or less; (2) improve physical toughness as well as resistance to chemicals and industrial contaminants of all types; (3) improve adhesion to a greater variety of surfaces; (4) impart color-fastness and eliminate yellowing; and, in general, improve the aging properties of the paint to give long-lasting, good looks for both indoor and outdoor service.

Development work led not only to improved rubber latex (butadiene-styrene) binders, but also to two entirely different types of binders. The first of these new binders, polyvinyl acetate, was developed in Germany as a result of wartime shortages of paint materials.

The newest type of latex binder is the acrylic resin. Acrylic paints are now being manufactured by more than 400 paint firms. Most of these paints are based on an acrylic resin emulsion, Rhoplex AC-33, developed by the Rohm & Haas Co. Before discussing the properties of acrylic latex paints, some basic explanations and definitions may be helpful.

The two basic ingredients in paint are (1) the pigment; and (2) the

Fig. 1. Plastic paints may be applied by brush, roller or by spray gun, as shown here. These paints can be used in a wide variety of indoor surfaces, including painted or pre-primed wood, plaster, wallboard, masonite and on pre-primed metal

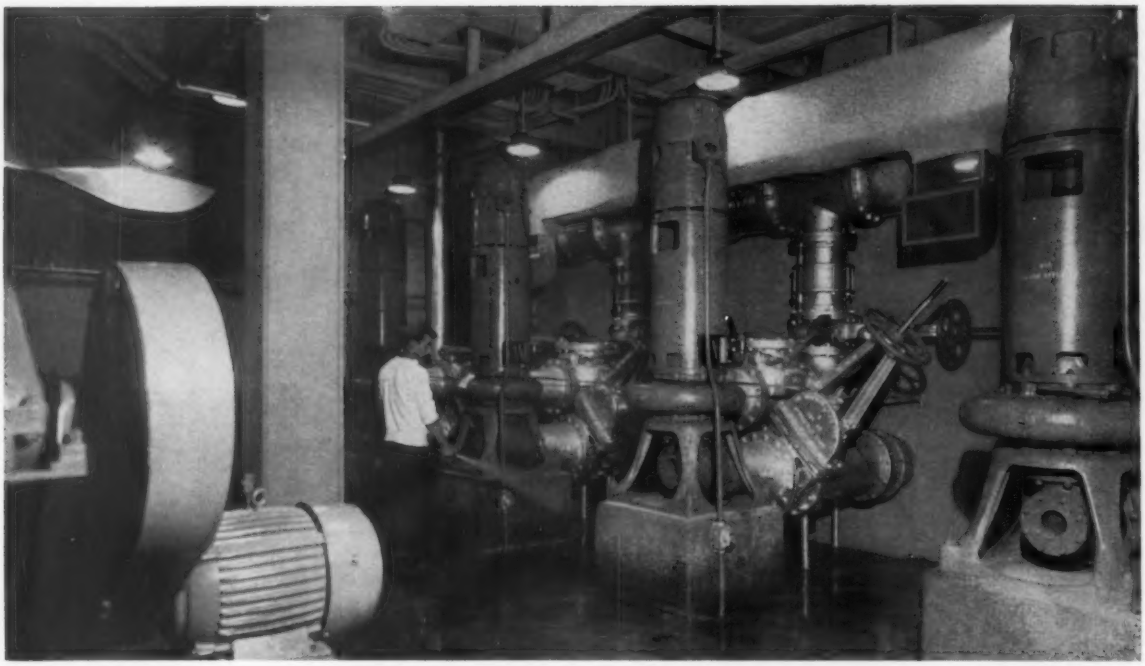


Fig. 2. Moisture resistance of plastic paints solves the problem of flaking and blistering in areas which are naturally damp, such as boiler rooms, wash rooms and plant kitchens, or which are hosed down frequently, as in the case of this pump house

vehicle (containing thinner and binder).

Pigment — The pigment consists of small particles of several types of opaque materials which perform the following functions. The pigment gives the paint its color and its hiding power, and helps protect the paint film (or binder) from deterioration by sunlight.

Another class of pigments frequently used is extenders. These have little hiding power but, when used in proper proportion, give the paint certain other desirable properties such as low sheen, improved flow and reduced settling of the pigment.

Vehicle—The vehicle is the liquid portion of the paint and contains two basic components: the thinner and the binder.

Thinner—The thinner is the volatile component which evaporates, leaving behind the solid paint film. The purpose of the thinner is to reduce the viscosity of the paint so that it can be spread on easily and uniformly.

In the solvent-based paints, the thinners are organic materials, such as turpentine, mineral spirits, naphtha, etc., and it is these solvents which are largely responsible for the odor associated with paint. Low-odor organic thinners are being used in some solvent paints, but these are flammable and should be used in a well ventilated room.

The latex paints, on the other hand, are thinned with water. Consequently, they are almost completely odor-free, quick drying, and are easy to apply and clean up afterwards.

Binder—The binder is the nonvolatile component in the vehicle. It has the important function of binding the pigment particles into a uniform paint film. The nature and amount of the binder determines most of a paint's important service properties; e.g., toughness, adhesion, aging stability, and resistance to abrasion, weathering and chemical attack.

In the solvent-thinned paints, linseed oil, soya oil, dehydrated castor oil, and alkyd resins or varnishes made from these oils, are the commonly-used binders.

The three latex paints mentioned in this article are named for their binders: butadiene-styrene, polyvinyl-acetate and acrylic resins. These paints are referred to as emulsion paints because the binders are not actually dissolved in the thinner, but are dispersed in it in the form of tiny particles.

Of all constituents in paint, the binder probably has the greatest influence on the properties of the finished paint film. The binder of acrylic emulsion paint is chemically related to acrylic plastic, the tough, optical quality plastic which is used for such varied applications as industrial glazing, lighting diffusers, electrical insulators and valve parts. Acrylic plastic has unusually good resistance to impact, weathering, and industrial atmospheres, as well as to oil, grease, acids and alkalis. This combination of desirable physical and chemical properties of acrylic plastic is "inherited" by the acrylic resin used in the paint.

Properties of Plastic Paints

Bear in mind that the properties of plastic paints apply to these paints as a type. Variations in formulation by a manufacturer to emphasize certain properties can produce corresponding variations in paint quality and performance.

Acrylic paints are made as outdoor primer-sealers and finish paints for indoor or outdoor use. One of their chief attributes is their versatility. Outdoors, they are being used on stucco, masonry, cinder

block, concrete, tile, asbestos shingles and siding. Because of their chemical resistance, they are recommended for alkaline surfaces, such as fresh plaster or concrete. They are also recommended for new construction, since the masonry can be painted without the several weeks' delay normally required to permit curing and drying.

Indoors, this paint can be used on a wide variety of surfaces, including painted or pre-primed wood, plaster, wall board, masonite, and on pre-primed metal. They have excellent heat resistance and give dependable service over insulated surfaces and hot water lines.

Plastic paints have what is termed good "hold-out" over porous surfaces, that is they tend to coat the surface rather than soak into the material. This explains their usefulness in sealer and primer applications.

Since acrylic paint films can breathe, water vapor which is trapped or collected in a porous structure can pass freely through the paint film without blistering or peeling the coating, which eliminates one of the common causes of paint failure. As a result you can paint over moist surfaces, in damp weather, or in chronic problem areas such as storage areas, humid basements, boiler rooms, wash rooms, kitchens and plant areas utilizing quantities of process steam.

Plastic paints can be applied successfully under unfavorable atmosphere conditions, including high humidity and at temperatures in the low forties. They can be applied by any of the three standard methods: by brush, roller or spraying.

Drying Time: 30 Minutes

An acrylic paint dries to the touch and is ready for a second coat in 30 minutes. Because of the short drying time, two coats can be applied in a large area in less than a day, and long high walls or ceilings can be recoated with little or no scaffold shifting. Plant cafeterias can be painted between meals or after hours and returned to operation without loss of service.

Plastic paints have a faint, pleasant odor upon application which vanishes completely in about 30 minutes. Needless to say, this is an important advantage when the painting is done in offices and in plants making edibles or other products susceptible to odor pick-up. It is particularly welcome to paint crews working in an unventilated area, where the fume concentration usually builds up very quickly.

With any paint the degree of color fastness is governed to some extent by the type of pigments used, the darker shades being more susceptible to fading outdoors because of ultraviolet effects. However, a good light-resistant binder will not only protect itself against ultraviolet deterioration, but also minimizes color change in the pigments. Acrylic binders are notably stable in sunlight, which has led to their widespread use in Florida and southern California.

Surface Conditions — With all paints, the life of the paint job depends upon the condition of the surface. Surfaces should be reasonably clean and free of grease and oil. High-gloss surfaces should be roughened slightly by sanding or by washing with tri-sodium phosphate or other alkaline cleaner.

Old whitewash, casein paint, cement paint or other water-sensitive materials which have poor adhesion

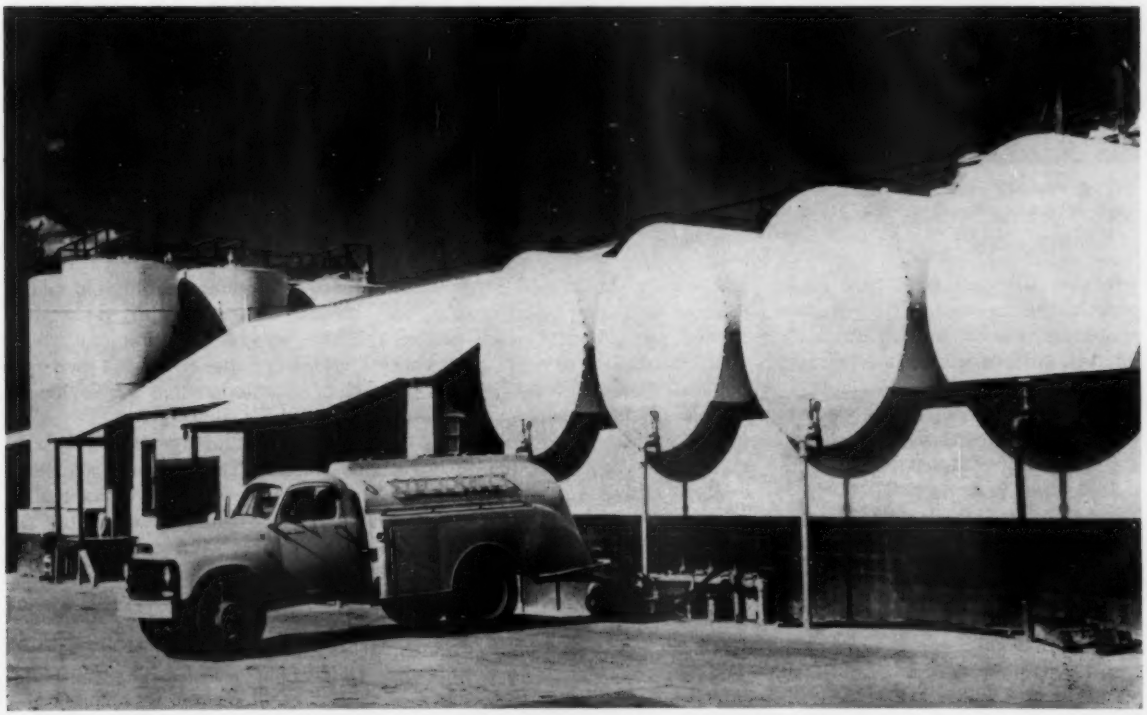


Fig. 3. Plastic paints containing special reflective pigments are used to reduce interior temperature in buildings and evaporation losses from storage tanks. In this application, paint film must withstand surface temperature of 140 F during the day

and which dust freely should be removed before painting to give the new paint a firm base to adhere to. Old cement-type paint may be particularly troublesome because of deterioration in the cement coating.

Even though the new paint bonds to the loose chalk surface, the underlying surface may fail and cause peeling. In such cases, adhesion can be improved by using a penetrating anchor-type surface conditioner before painting, but sandblasting is probably the only sure cure available at the moment. If no surface treatment is used, wetting down the chalked surface just before painting will improve adhesion.

Most glazed asbestos shingles can be painted successfully, although some types of shingles may be difficult to wet and may fail early if painted when brand new. If raw shingles are allowed to weather for a few months to remove the surface glaze, they normally can be painted without difficulty.

Painted wood, even if weathered, can be painted easily. Nail holes should be puttied to prevent rust bleed-through especially with lighter colored paints. When white or light-colored paint is applied to redwood or cedar siding, water soluble substances in the wood may bleed into paint unless surface has previously been painted with an oil paint.

Because of their high porosity, bare cinder block, stucco and cement have a high water demand, that is, they blot up the water so readily that the paint is difficult to spread. To avoid this, the surface should be thoroughly wet down before starting to paint. If this is impractical, the painter should add extra water —about a quart, more or less, as needed, per gallon of paint—to prevent unduly fast drying and permit adequate flow and levelling.

Methods of Application — Paints may be applied by brush, roller or spray gun. Since the paints brush easily, brushes four to six inches wide may be used. Tapered nylon brushes are among the most satisfactory because, being non-absorbent, the fibers retain their natural resiliency and permit uniform coverage and freedom from lap marks.

Nylon brushes are easy to clean since the paints do not penetrate the filaments appreciably. Brushes or rollers should be wet with water before painting to satisfy their water demand. It is a good practice to change brushes every hour or so, putting used brush in pail of water.

Rollers can be used very satisfactorily. Generally, dip rollers are preferable to the fountain type since they are lighter, easier to clean, and create less foam during application. Long-nap rollers should be used on rough cement, brick, or stucco.

For spray application, the paints may be used at approximately the same viscosity as for brushing but can, if desired, be thinned slightly with water. External-mix spray guns should be used at 35 to 40 lb line pressure. Bleeder-type guns operated at low air pressure are usually not recommended because they tend to clog.

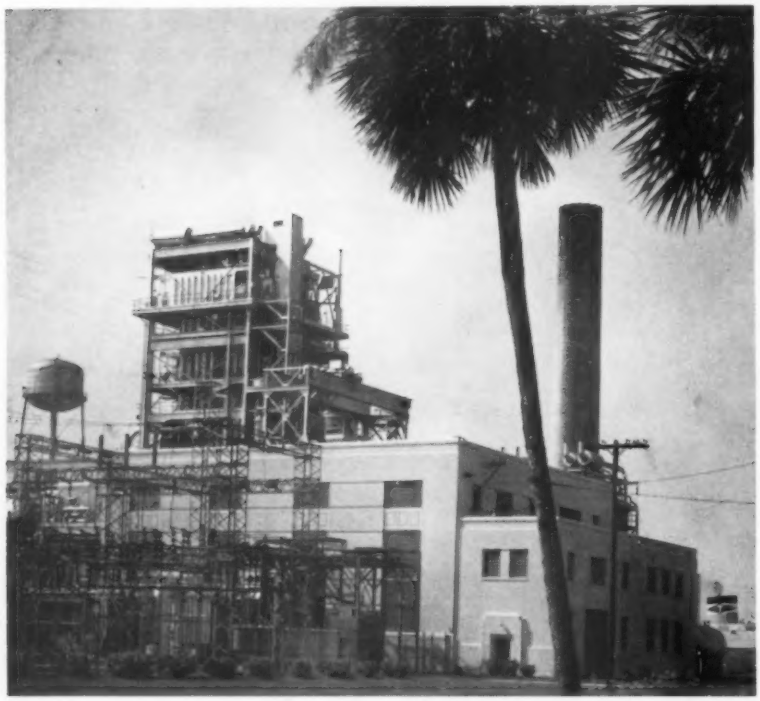


Fig. 4. Cement exterior of the Florida Power and Light plant received a single coat of cream-colored acrylic paint in 1955, and it is still in good condition

For Exterior Work . . .

In all exterior work, avoid spreading the paint too thin. Since the paints go on very easily, it is possible to brush out the paint excessively which, of course, will reduce hiding and durability. A gallon of paint will usually cover 300 to 500 sq ft depending on the roughness, water demand, previous treatment, and kind of surface.

Plastic paints dry very quickly, so that window sash should be moved shortly after painting to avoid sticking. If a torch is used to remove old acrylic paints, it should be moved rapidly over the surface and just enough heat applied to soften the paint and permit its easy removal with a scraper.

Exterior paints should be applied in reasonably good weather, although dampness and high humidity do not interfere with application. There is a definite minimum temperature of application for each specific formulation and for each surface to be coated.

Some formulations can be applied to non-porous surfaces at temperatures as low as 35 F without difficulty. Other formulations may require higher temperatures for successful application. Porous surfaces require higher temperatures for film formation than non-porous surfaces. Consequently, each formulation should be tested on various surfaces to determine the minimum temperature for satisfactory application. **End**

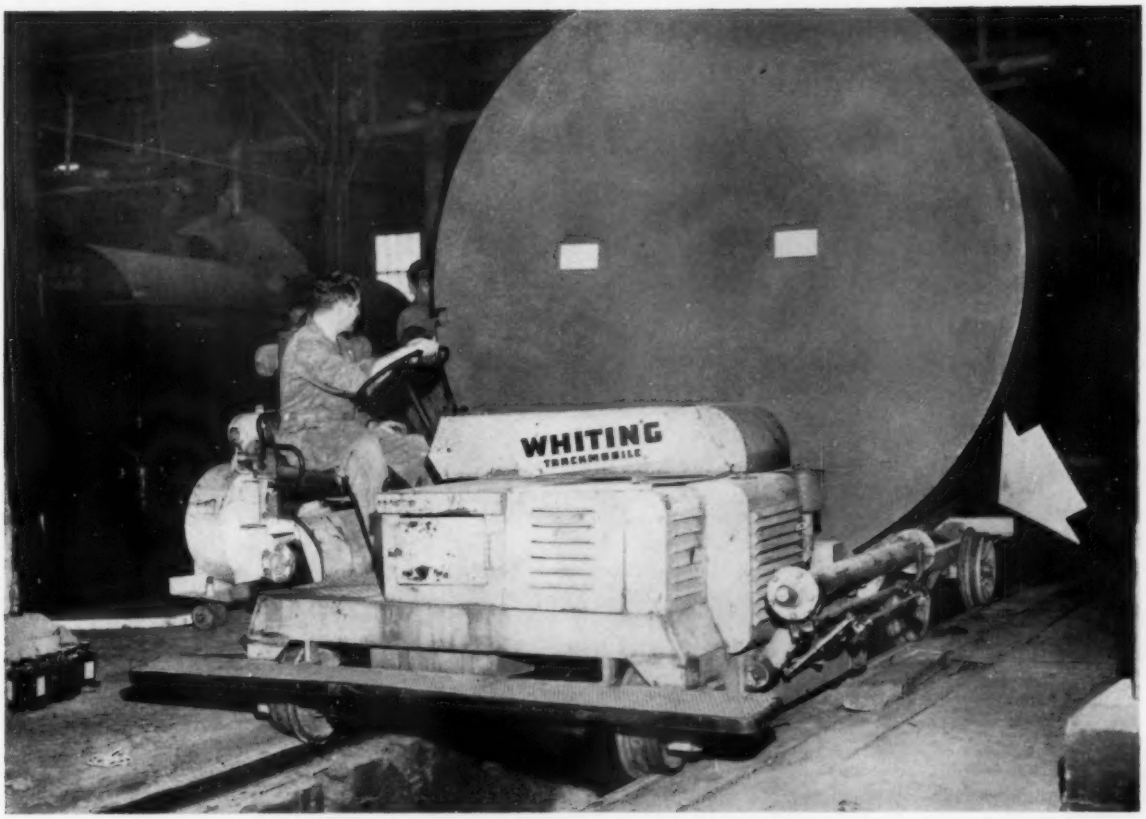


Fig. 1. Large storage tanks, loaded on special, flanged-wheel dollies, arrow, can be hauled easily to various coating operations

Want a Plant With Railroad Trackage?

Lithcote Adapted Old Roundhouse, Found It Ideal for Operations

By ALEXANDER T. BALDWIN, JR., Plant Manager, Lithcote Corp., Melrose Park, Ill.

RAILROAD ROUNDHOUSES probably offer more track per square foot than any other type of industrial building. It was that feature that prompted the Lithcote Corporation to transfer its midwest operations from a conventional industrial building in Chicago, Ill., to a large, abandoned railroad roundhouse in nearby Melrose Park.

As a custom applicator of protective chemical coatings and linings, our company does a sizeable amount of its business in the lining of railroad tank cars. Customers in the railroad equipment industry ship their cars to Lithcote for this service which generally consists of sandblasting the car interiors, then applying plastic resins by spraying. After this, they are baked by injection of hot air. The roundhouse has 17 sets of tracks, enabling us to handle 30 tank cars at a time.

Non-rail customers are served as well. Work for them is largely shop work which enters the plant by truck as well as by rail. Equipment brought in for application includes chemical manufacturing and transportation equipment, such as conveyors, truck tanks, filtering tanks, pipe and fittings, batch tanks, mix tanks and turbines.

As the roundhouse was designed to receive equipment on flanged wheels only, there was no provision for lateral materials handling. However, with some modifications, and by using special dollies, it has proved just as convenient for this type of materials handling.

First of all, a 10,000-sq ft area in which equipment to be coated could be positioned and moved on skids and dollies, was resurfaced. This involved filling eight of the service pits originally used in the maintenance of steam locomotives and covering over old tracks.

Each pit, which measured 5 ft

wide, by 96 ft long and 4 ft 6 in. deep, was filled to a depth of 4 ft with sand and topped with a 6-in. deep slab of concrete to provide a solid, even surface. Approximately 500 cu yd of sand and 14,000 sq ft of concrete were needed for the job.

Even without interference from the tracks and pits, resurfacing of this area was a necessity, since the floor was in a poor condition from oil and grease, accumulated over decades. Various methods of removing this accumulation were tried, including solvents, detergents, flame spray burning, and even air hammer chipping, but none worked satisfactorily and eventually a new concrete floor was laid directly over it.

Several of the unfilled service pits were used in conjunction with the water washed dust-collecting system —a necessity in sand blasting operations. Instead of constructing a separate recirculation tank for the dust collector, one of the pits was filled with water to handle this function. Two other pits were filled with water for use with a 1600 cfm air compressor which was installed. This, together with the compressed air piping system already in the plant, provided substantial savings.

All previous wiring and conduit had to be removed and new transformers, electrical wiring and conduit were installed. Originally, the roundhouse did not have a natural gas line and arrangements were made to run an underground line from a nearby main pipeline and to install new overhead piping, valves, etc., throughout the roundhouse.

New space heaters were installed. These operate by steam furnished under contract from the railroad which still maintains boilers for its own use. The steam lines used are also a previous railroad installation.

Install Spray Booths, Ovens

Space was cleared in the shop area to accommodate spray booths, a sandblast room, and two baking ovens which required floors of insulating cement. Three small offices, formerly used by the roundhouse foremen, were adapted to Lithcote's use and the adjoining locker room was made into a laboratory by the addition of new power lines, water lines, drains, a space heater, and the necessary laboratory equipment.

Parts of the roof had to be renewed. Elsewhere, numerous 24-in. diameter funnel-shaped openings, spaced along the roof to allow locomotive smoke to escape, were boarded over and made weatherproof. The chimneys over these openings were removed as a safety precaution.

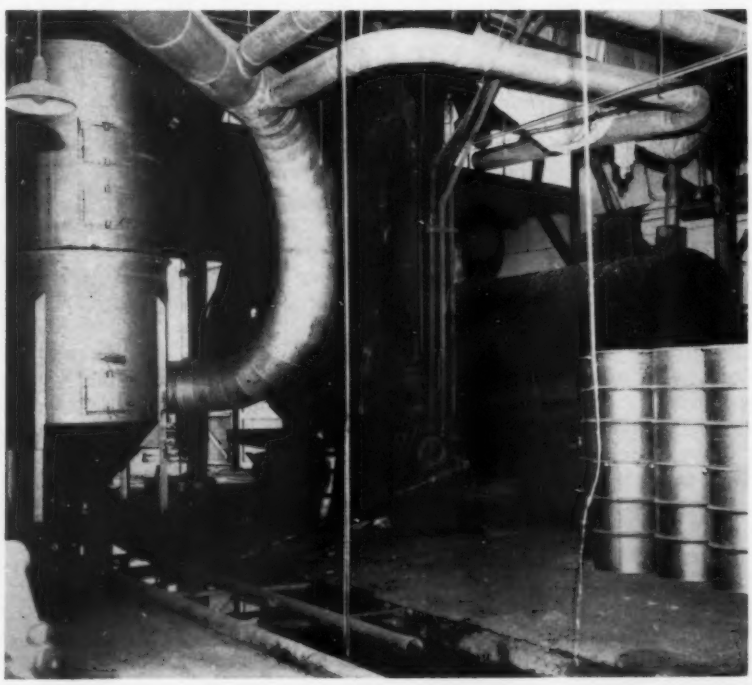
The lateral materials handling problem was solved quite simply. To provide for unloading equipment brought to the plant by truck, a section of the outside wall was knocked out and double doors installed. Additional steel framework was also installed to support an overhead crane used to pick up incoming loads. Track in that section was also resurfaced.

Large storage tanks and racks of pipe coming into the plant for treatment, are loaded on to special dollies fitted with flanged wheels. In this way they can be moved around easily and hauled on the dollies to various areas as needed. For instance, after being hauled into the sandblasting area, they are pulled out along the tracks, placed on the old locomotive turntable, which is then turned to the set of tracks leading to the paint spray area. The load is then hauled to this operation. All this handling is done with a Trackmobile.

The result of the conversion has been to provide us with a generally ideal setup for our type of operation. **End**

Fig. 2. Small items also travel on dolly

Fig. 3. Former service pit, foreground, is used as water reservoir for sandblasting



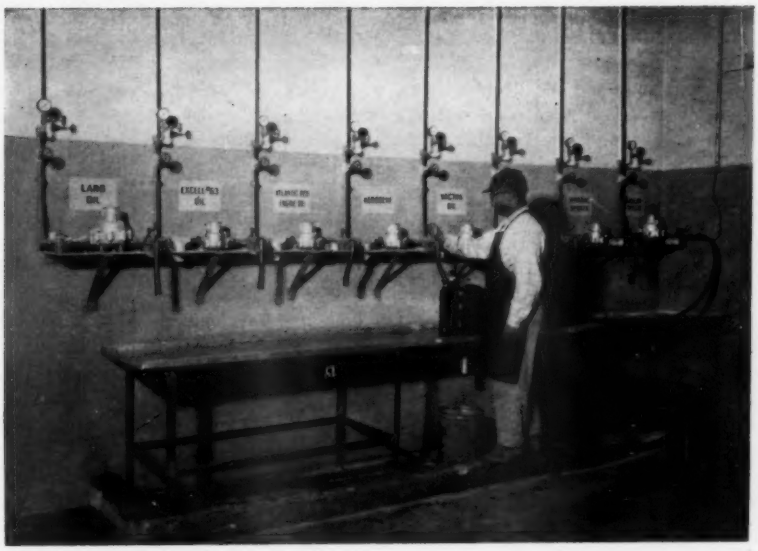


Fig. 1. Fluids are pumped from underground tanks to this metered dispensing station in a storeroom. Several other similar stations are found in various locations in the large plant

Handling and Dispensing Materials

Liquids Are Metered; Cylinder Banks Feed Gases

FOR HANDLING ECONOMY, solvents, oils, acids, and gases are piped direct from bulk storage to major points of use in the new plant of Automatic Electric Company, Northlake, Illinois, a leading manufacturer of telephone and industrial control equipment.

Prior to moving into its new 1,520,000 sq ft manufacturing facility in the Chicago suburbs, this manufacturing subsidiary of General Telephone formerly had purchased and issued these materials in drums or other suitable containers. The new distribution system was designed to gain the advantages of: lower unit costs resulting from bulk purchasing; the elimination of labor costs in handling both full and empty containers; and the elimination of storage requirements. In addition, the new system offers users greater convenience than was formerly possible.

Eight underground tanks — three of 3,000 gallon capacity, and five of 6,000 gallon capacity—provide bulk storage for the oils and solvents such as mineral spirits, trichlorethylene, and lard oil, which are used in large quantities by the company's manufacturing departments. These tanks, located adjacent to the plant, are filled from suppliers' tank trucks.

Fig. 2. Bank of remote liquid level indicating gages keeps track of supplies. Electrical switches with high-low pressure settings control pump operation

Pumps, one for each of the pipe lines, are located against the outside plant wall. In order to prevent sluggish flow during cold weather, pumps for oils and solvents that are heavier than water, have steam jackets. The capacity of each pump is such that spigots at all using points can be opened simultaneously, and flow can still be maintained.

Inside the plant, on the wall opposite the pumps, the remote level indicating gages are mounted. See Fig. 2. At this location all pipes lead into the space between roof trusses.

There are eight dispensing stations throughout the plant. One or a number of the oils and solvents are available at each of these locations. Seven of these stations are located in manufacturing departments. The eighth station is located in the oils

and paints storeroom and is used primarily for small quantity issues, on material requisitions.

Meters installed in the pipe lines at each of the dispensing stations indicate the amounts of the various materials drawn at that location. See Fig. 1. Tentatively, each using department is required to submit periodic "draw requisitions" showing both the previous and current readings. The amount used between readings can then be charged against that department.

Master level gages are read weekly and reported to the Production Control Department, which initiates ordering action when necessary. The total consumption indicated by the master gage should tally with the totals recorded on the draw requisitions submitted from all dispensing stations.

Large quantities of sulphuric and muriatic acids are used for parts plating in the processes of manufacture. Two raised tanks, of 3,000 gallon capacity each, provide out-of-doors storage facilities for these materials. Pipes running from these tanks to a point of use are laid in a floor trench, whose removable steel plates permit access. Since the plating department is the principal user of these agents, both pipe lines terminate in that department's large plating vats.

The plating department has a number of auxiliary plating vats whose capacities are insufficient to justify branches from the main pipe lines. A carboy filling station has been set up for replenishing and recharging the contents of these vats from the main acid distribution lines.

Hydrogen and nitrogen are manifolded into overhead distribution pipes for use at eight different locations throughout the plant. The manifold system at present provides for the connection of four banks of cylinders, each of which is composed of 12 series-connected units. See Fig. 3. Two of these banks—one of nitrogen cylinders and the other of hydrogen cylinders—provide active supplies to the pipe lines. The other two banks constitute reserve supplies. Automatic regulators switch in the reserve banks when the active supplies of gases are depleted. Pipe line pressures are kept at 2,000 psi, and audible alarms signal pressure drops in the pipe lines.

Fig. 3. Hydrogen and nitrogen bottles are grouped in banks of twelve units

Because the plant's natural gas needs are in excess of the available supply, propane is used as a supplemental heat source. Two 30,000-cu ft tanks provide facilities for propane in liquid form, which can be delivered either by railroad tank car or tank truck. Vaporizer equipment has the capacity to handle 8,000 cu ft of propane per hr. The L-P gas is piped into the plant where, by the manipulation of valves, it can flow through the natural gas pipes to any and all localized areas in need of it. **End**

Magnets Hold Tools for Dip Painting

MANUFACTURING-engineering personnel of the Metallurgical Products Department of General Electric Company, solved a problem in production painting through the use of magnets.

After inspection, unpainted mining tools are delivered to an overhead conveyor line, where they are attached by hand. As the line moves, it dips to permit tools to enter a lacquer bath. For drying, they pass a blast of compressed air and a circulating chamber.

With several sizes and shapes of tools in production at all times and mixed shipments regularly required, no mechanical fixture for holding these products on the conveyor line proved sufficiently simple and troublefree.

The answer came in the form of Alnico V magnets. More than 400 of those one-ounce horseshoe objects were attached with wire loops to suspended conveyor channels. Magnets are arranged with like poles next to each other, so that they do not pull together.

Tools are dipped into aluminum lacquer, which is kept stirred by a mechanical agitator. As they emerge, a blast of compressed air hits the tools to knock off built-up paint at the nose and at the upper end of the tool near the magnet.

After removal of the tools, the conveyor line continues and the magnets pass through a hot alkaline cleaning solution to remove any paint, and from there through a hot water rinse. **End**

Fig. 1. Painted mining tools are removed manually from the horseshoe magnets after their conveyor trip during which they are dipped in aluminum lacquer

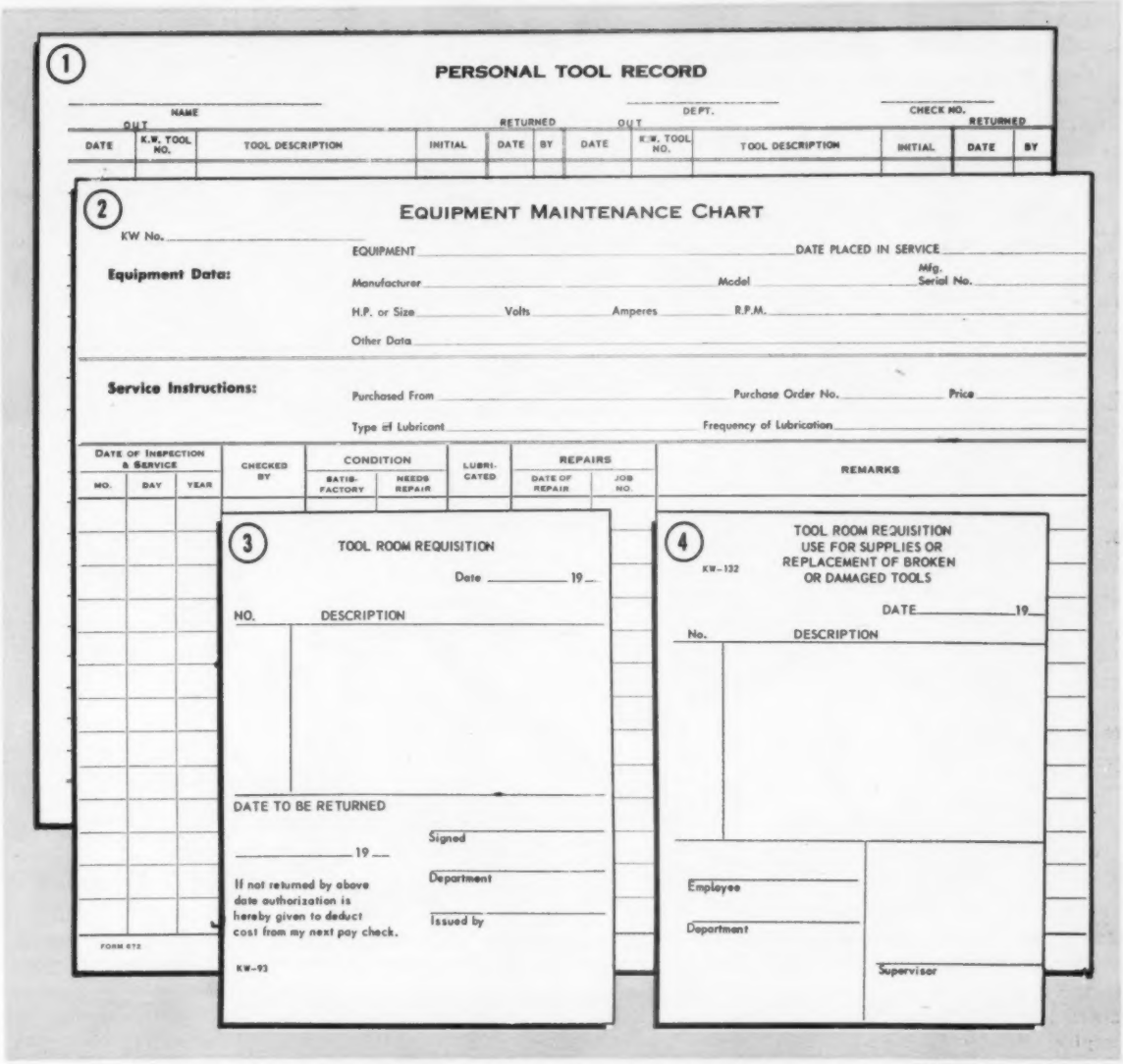


Fig. 1. Form labeled 1. above, is personal tool record; 2. equipment maintenance form; 3. tool requisition for supervisors; and 4. requisition for replacement of broken tools. These and two others are only forms used in three Kenworth tool rooms

Keeping Tabs on Plant Tools

Simple System of Forms and Checks Works Well for Kenworth

PLANT-PLANNED METHOD of operating its tool rooms, has paid off at the Kenworth Motor Truck Company of Seattle, Wash. by increasing production, sharply reducing the consumption of expendable supplies and cutting down the number of damaged or broken tools.

B. L. (Bud) Fitzgerald, supervisor of the plant's three tool rooms, cited one example of savings which were gained as a result of the system.

"In the past two years, company expenditures for sanding disks have dropped at least 60 per cent," Fitzgerald said. "The same amount of work is being done with sanding disks. Employees have become aware of their cost and are getting maximum service from each disk."

These and other savings result from the use of two forms in the tool rooms.

Both forms, see Fig. 1, were originated by Fitzgerald. One is a requisition slip. It is used for replacement of broken or damaged tools and to obtain materials and supplies which aren't returned after being used—supplies such as rubber gloves, sanding disks, paint brushes and flashlight batteries.

The other form is a monthly report which itemizes expendable supplies issued by the tool rooms and

Good Tool Room Organization At Kenworth Motors Assures:

1. **Less time needed to secure tool giving increased production**
2. **Pinpointing location of every tool in plant at any one time**
3. **Monthly report of tool costs, supplies, repairs, replacements**
4. **Provision of individual tool histories**

shows the number and types of tools broken or damaged.

The monthly report indicates the cost of supplies and replacement and repair of tools. It shows each department's share of the total.

"This monthly report to all departments in the plant has made both supervisors and employees conscious of the costs involved in supplies and tool replacements. It has resulted in reduced use of supplies and fewer damaged tools," Fitzgerald said.

The new organization of the tool rooms resulted in increased production for two reasons. Workers now require less time to secure tools. Also, the location of each tool is pinpointed by cross-reference files, making it readily available when needed.

Fitzgerald set up the new system several years ago, after spending approximately a year preparing for it.

He studied tool room methods employed by several Seattle-area firms. He read literature describing systems used by companies throughout the United States.

He adopted practices employed by other companies which were applicable to the Kenworth plant operation, originating forms and routines tailor-made for the plant. And during the past few years he has modified or changed certain phases of the system to make the operation even more efficient.

The system operates in the following manner.

Each portable power tool is identified with a "KW" number when it is first received in the tool room. These numbers range from 1 to 5,000 and the series now has reached number 2,230.

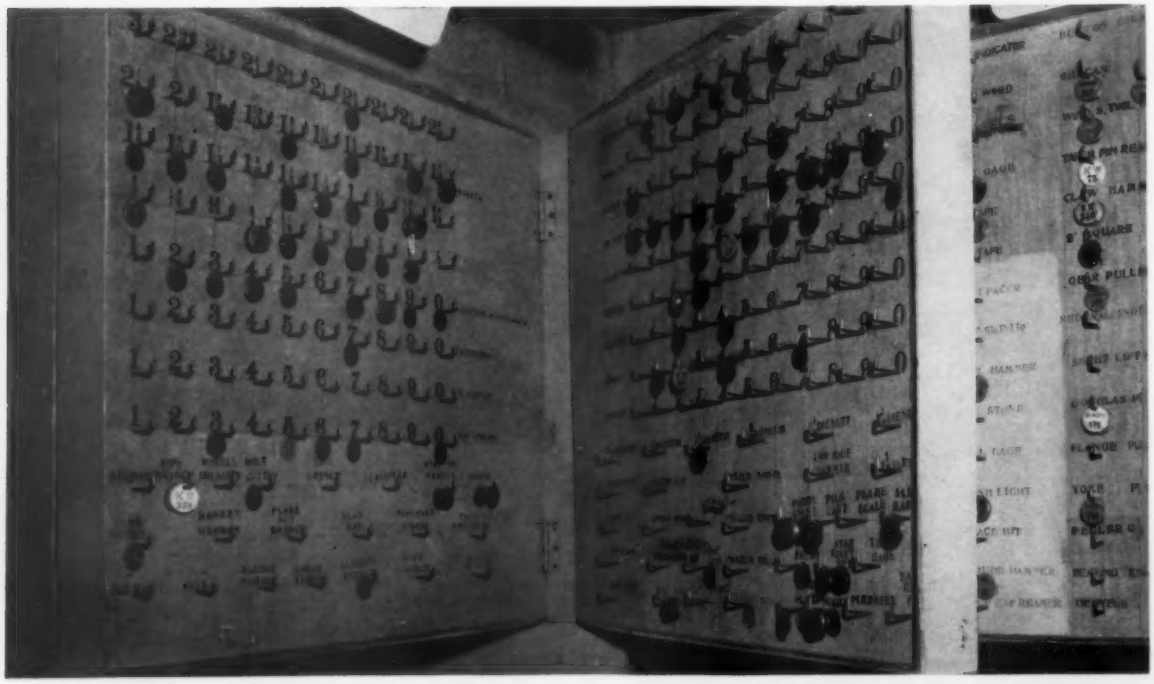
This does not mean the tool rooms contain 2,230 power tools at the present time. Many of the numbers are those of tools which have been junked, lost, sold or replaced since the number was issued. A number is not used twice.

The KW numbers give each power tool a separate identity, even when there are several of the same type. The number is stamped, engraved or burned on the tool.

At the same time, an "equipment maintenance chart," Fig. 1, is made out for the tool. Information on this form includes the KW number, manufacturer's number, date placed in service and a general description of the tool. On the bottom of the chart the maintenance department records all servicing and repair provided the tool.

This is the primary form used

Fig. 2. Tool check cabinet consists of several leaves, opens like book. Numbered brass check, issued to individual worker, is hung against appropriate tool number when he takes tool on short loan; otherwise entry is made on personal tool record



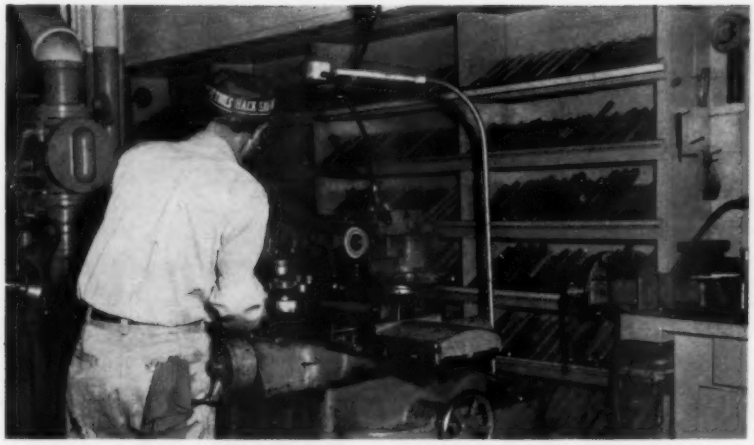


Fig. 3. Machine shop tool room is well organized, equipped to maintain tools

in the tool rooms. It serves as a cross-reference and is the only record which is kept when the tool is disposed of. It remains a permanent record.

The tool rooms have three other forms in their filing systems.

One is a "service and record card" for each power tool. On the front of this card is entered the KW number and the name of the tool. Withdrawals are noted on the front by date and employee's name. The date the tool is returned to the tool room is recorded there, too.

All servicing and repair work is shown on the back of this card. All tools are serviced at least once a year. If an employee doesn't bring a tool in when it should be serviced, it is called in by the tool room.

Another form is a tool check card. One is made out for each tool check number. A set of 10 tool checks with the same number is issued to each production worker in the plant. The card shows when the number was issued to what employee. It also shows when he turned in the checks. This provides ready identification of the personal numbers issued to about 1,000 employees.

The final cross-reference form is a "personal tool record." One is made out for each worker. It shows the employee's name, the department he works in and his tool check number. When a tool is checked out for a long period of time, it is entered on this form. When it is returned, the date is entered.

These four cross-reference forms are the heart of the system. With them, tool room personnel can immediately determine the status or location of a power tool by checking the KW number, the type of tool, the tool check number or the employee's name.

These forms apply only to portable power tools. Other tools are withdrawn by tool check. When this type of tool is issued, the employee's tool check is placed on a hook which is marked for the type and size of tool it represents. The hooks are contained in multiple-leaved cabinets which hang beside the tool room counters for convenience, see Fig. 2.

Thus, tool checks are used only for tools which are needed for a short time. Those required for long periods, or permanently, are checked out to the employee by recording the transaction on the personal tool record and the service and record card.

Short-Loan System

Employees who occasionally need a portable power tool for only an hour or so used to pose a problem for Fitzgerald. Under the system, it had to be entered on a personal tool record and a service and record card before it was issued. Then, maybe only a few minutes later, the tool was returned and the two forms again had to be marked.

This was inefficient and took more time than was justified. So, Fitzgerald classified from one to three of each type of portable power tool as "daily tools" and made them issuable only by tool check. Appropriate hooks were marked in the cabinets. These "daily tools" can be checked out for no more than a day at a time.

Only one other form is used by the plant's tool rooms. It, too, was originated by Fitzgerald. It is a tool room requisition slip which is used by supervisory or executive personnel who don't have tool checks. The tool rooms issue tools for non-productive jobs on these forms. Such tools include tapes to measure an area for a new shop layout, levels to check installations and similar tools which are not used directly in production work.

The requisition slips are kept on a spindle, since few tools are checked out for this use and they seldom are used for more than an hour or two.

Fitzgerald set up a special procedure to handle broken or damaged power tools.

When a tool is brought to a tool room for repair, the employee is given a special "in repair" tag which he will later use to reclaim his tool. At the same time, a "daily tool" of the same type is issued to him on a tool check. He can use this tool until his original tool is repaired.

If the tool is beyond repair, it is disposed of, its master card, the "equipment maintenance chart," is so marked and its "service and record card" is destroyed. The master card is kept in a permanent file.

Another tool of the same type, but with a different KW number, then is issued to the employee and the information is entered on the employee's personal tool record and the tool's service and record card.

The three tool rooms in the Kenworth plant are the main tool room and the machine shop tool room, Fig. 3, which are connected as a single unit, and the repair and test department tool room. All three have the same types of files and tool check cabinets. Wooden cabinets for instance are used for storage of cutters and reamers, since the tools would be dulled if kept in metal bins.

Tool room personnel do all repair and maintenance work on the plant's tools. Equipment such as saw sharpening machines, drill pointing machines, cutter grinders and engraving machines are installed in the tool rooms to handle this phase of the operation. **End**

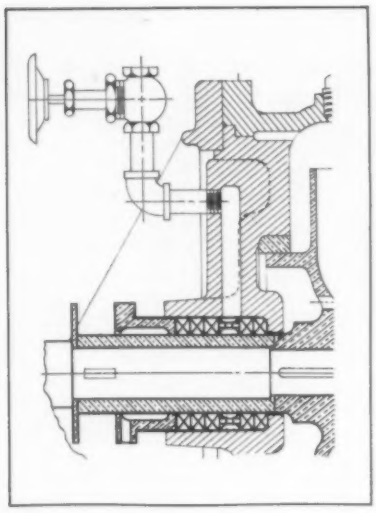


Fig. 1. This is an external seal as used on a single suction pump. When the liquid being pumped is unsuited for use as a sealing medium a clear liquid from an outside source is introduced

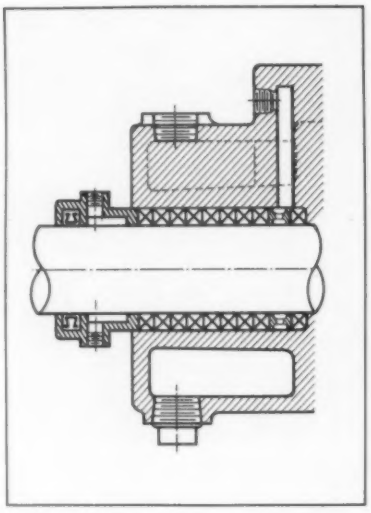


Fig. 2. This is a water-cooled stuffing box with a smothering gland. Where liquid being pumped is above 250 F stuffing boxes need a cooling water jacket to reduce shaft heat transmission

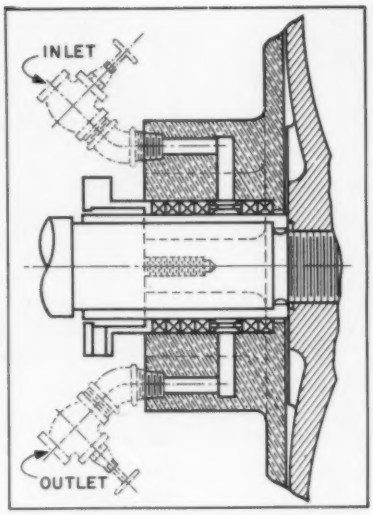


Fig. 3. The "in and out" stuffing box seal system consists of "in" and "out" connections to the packing gland with valves in both connections so that the liquid can be controlled

How To Get What You Need in Pumps

IV. How Standard Stuffing Boxes Can Be Modified

By J. A. CABLE, Centrifugal Pump Dept., Allis-Chalmers Mfg. Co., Milwaukee

STUFFING BOXES have long been called a "necessary evil" in centrifugal pumps. In order to pump, the impeller must be driven by a shaft which must pass through the casing at least once. It is desirable, and necessary, to minimize leakage at this point of entry. Depending on the type of pump and the service, the pumped liquid could flow out of the pump, or air might flow in to the pump.

Early centrifugal pumps employed a packed stuffing box with the packing compressed into the space between the sleeve and the casing bore. Various versions of the packed stuffing box still make up the largest group of leakage-throttling devices.

In recent years devices have been developed to provide a mechanical seal between a stationary and rotating face. A wide variety of these mechanical seals are now employed

Table I. This table presents some of the more common terminology in connection with stuffing boxes on centrifugal pumps

Terminology	Means that —
Inside Seal or Internal Seal	Liquid being pumped is used to lubricate and seal the stuffing box. This is usually standard.
Outside Seal or External Seal (Fig. 1)	Some liquid is introduced from a separate source to lubricate and seal the stuffing box.
Seal Cage	A ring installed between rows of packing which is machined to provide sealant circulation completely around the shaft sleeve. (Also called "waterseal" or "lantern" ring.)
Snuffing Gland or Smothering Gland or Quench Gland (Fig. 2)	Some liquid is introduced into the gland from a separate source. Any leakage out of the packing is absorbed into this sealant so that the leakage can not escape directly to the atmosphere. (For example, if pumping super-heated water this would prevent leakage from burning some one who got too close.)
In and out Seal Connection (Fig. 3)	Pump has two taps to the seal cage area so that seal liquid brought in from outside source can be controlled by observing in flow and out flow at this point.
Water Cooled or Water Jacketed (Fig. 2)	There is a separate cavity surrounding the stuffing box outer wall for the purpose of using water to cool this area. This cooling water does not contact the fluid pumped, being confined to flowing through the jacket.
Bushing	It is used to form one side of a limiting close clearance. At the same time it is separately replaceable so that the clearance can be renewed economically.
Packingless Box	Replaces the packing with a series of bushings each of which further reduces the pressure imposed at the high pressure end until the pressure at the outer end approaches atmospheric.

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as standard equipment in small pumps and are available as modifications for many pumps which originally used standard packing. Every year finds more pumps being designed with mechanical seals.

What you need in stuffing boxes depends on several factors. Just as in rating and selecting the proper pumps, the application situation must be completely described to assure your getting the right sealing arrangement.

There are a few terms employed concerning stuffing boxes which it might be well to define before we try to discuss the pros and cons of various methods. See Table I.

Application factors and their effect on packing or mechanical seals are tabulated in Table II. These should

(Continued on page 242)

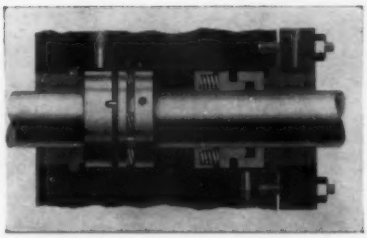

Fig. 4. This is a double inside, mechanical seal, essentially two single seals

Table II. Application factors affecting stuffing boxes and mechanical seals are paralleled in this table as a guide to users

PRESSURE: (Seals are usually limited by suction pressure)

With Packing	With Mechanical Seals
Standard arrangement of packing with seal cage and internal seal is ok for negative down to 15 ft of liquid up to positive 25 or 50 psi.	Standard ok for positive from 5 psi to 150 psi. (Maximum varies with type of seal and manufacturer.)
Greater negative pressures require external seals to be sure that air cannot leak in and prevent pump from priming. Also needed to prevent slower inleakage of air which can accumulate and cause pump to become air bound and thus loose its prime.	Any negative pressure requires that internal seal, if employed, must be arranged to assure liquid supply in seal cavity. With a mechanical seal if an external liquid is used for sealing, it is usually described as having a "flushed" type gland.
Greater positive pressures require metallic packing used in conjunction with hardened sleeves such as AISI-420 (11-14 per cent chrome steel) which is usually heat treated to 350-550 Brinell. If always over 5 psi omit seal cage and add an extra ring of packing instead. Ordinarily packing, even metallic, will not be too successful with pressure over 75 psi.	Greater positive pressures can be handled with mechanical seals of the balanced type. Their manufacturers set varying limits of 500 psi up to 750 psi with very special designs good for up to 1500 psi.

TEMPERATURE:

With Packing	With Mechanical Seal
Up to 212 F standard. 213-250 F standard with external, cool water, seal.	Colder than –40 F special seal to have cold resisting non-metallic parts and stainless metallic parts.
Over 250 F metallic packing, 420 AISI sleeve, external seal, smothering gland.	–39 F to 212 F standard. 213 F and up. Special seals using tetrafluoroethylene plastic rather than rubber non-metallic parts. Limit then 450-500 F.

LIQUIDS OTHER THAN WATER:

There are too many other liquids to discuss each separately. However, a few generalizations can help solve some of your stuffing box problems before they occur.

I Liquids with little or no lubricating properties

Packing	Mechanical Seals
With packing you'll often want to use a grease seal on the seal cage. This can be either hand or automatically operated.	With mechanical seals be sure to be specific about the liquid's description so that non-metallic parts of the seal will be chemically resistant. For example, if to pump aromatic fuels and the aromatic content exceeds 20 per cent you'll want tetrafluoroethylene plastic rather than rubber flexible members.

II Liquids with solids in suspension

With packing, specify outside seals and plan to have a supply of clean seal liquid available. About 5 psi greater than the pump's suction pressure is required for double suction pumps and single suction pumps with balancing provisions. Some single suction pumps may require 5 psi greater than discharge pressure.	Mechanical seals will not function with solids-laden liquids so plan clear liquid flushing of the seal cavity. This can be done by maintaining a closely restricted throat with incoming flow greater than possible throat leakage to assure seal operating in solids-free liquid or double mechanical seals, with the clear liquid introduced between the seals. This is ideal but is only practical on single suction pumps. (Fig. 4)

III Liquids which are hazardous—(where leakage to atmosphere would be harmful to occupants of the room in which pump is installed)

With packing, a quench gland will help gather the leakage so that it can be taken away in controlled "out" piping.	With mechanical seals either a single seal with quench gland or a double seal can be employed. A properly maintained double seal would eliminate loss of pumped fluid.

IV Liquids which are too valuable to permit leakage going to waste can be handled in the same way as the previous hazardous group.

V Acids and Alkalis

Packing with special fibres and impregnation are available for many of these liquids. Many will perform better with grease seals especially selected to give lubrication. Here again, it is of prime importance to fully describe the liquid to be handled.	Mechanical seals are available in a myriad of different metals and mechanical designs that often are specifically designed to fight your problem. Just be sure that the chemical nature of the liquid is clearly described. "Acid" alone means little as metals suitable in some might fail in minutes in others.

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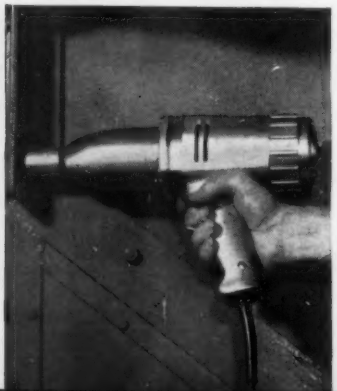

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AIPE Holds Fourth Annual Meeting

Representatives of AIPE chapters discuss Institute policy at annual meeting

MARKING THE FOURTH anniversary of its founding, the annual meeting of the American Institute of Plant Engineers was held on January 26, 1958, in Chicago. Fifty-eight delegates and officers, representing the 38 chapters of AIPE, gathered to conduct the national business of the organization.

Two of the major items of business were the approval of the dues increase requested by the Executive Committee, and the election of officers for the 1958 year. Those elected to govern the AIPE for the coming year are:

President, Sig A. Simonson, Chicago Hardware Foundry Co., North Chicago, Illinois. Sig was a charter member of the Chicago chapter and of his present chapter, Northern Illinois. He is one of the original incorporators of AIPE, and served as Regional Vice President, Region 3, last year.

Vice President, James M. Weeks, Proto Tool Co., Box 3519, Terminal Annex, Los Angeles, Calif. Jim is a member of the Los Angeles chapter, and served as Regional Vice President of Region 6, last year.

Secretary, John J. C. Coffin, Towle Manufacturing Co., 2606 Merrimac St., Newburyport, Mass. John was an original member of the Boston chapter, and was instrumental in organizing his home chapter, Merrimack Valley, which he serves as vice president.

Treasurer, Ken N. Banthin, Visking Co., Div. of Union Carbide Corp., 6733 W. 65th St., Chicago 38, Ill. A member of the Chicago chapter, Ken has served this group as secretary-treasurer, and as AIPE treasurer last year.

K. D. Hamilton Elected Fellow

For the second time, the AIPE selected a candidate to be awarded its highest membership grade, that of Fellow. This award is given to those men who have contributed to the profession of plant engineering.

Elected this year was Kenneth D. Hamilton, Ass't. Director, Industrial Planning Div., Bureau of Aeronautics, U.S. Navy. Mr. Hamilton's contributions to plant engineering have been numerous and valuable to industry throughout his career, and began with the publication in 1928 of a "Code of Ethics" for the plant engineer, which he helped to prepare. He is currently serving on an AIPE committee to revise this code.

Another feature of the meeting was the naming of regional vice presidents for the AIPE regions of this country and Canada. Already elected by the chapters in their regions, the following men will serve during 1958:

Northeast, Region 1: F. G. Fryberger, Food Machinery & Chemical Corp., Box 1616, Baltimore, Md.

East Central, Region 2: R. A. Harvey, Thompson Products, Inc., Valve Div., 1455 E. 185th St., Cleveland 10, Ohio.

(Continued on page 239)

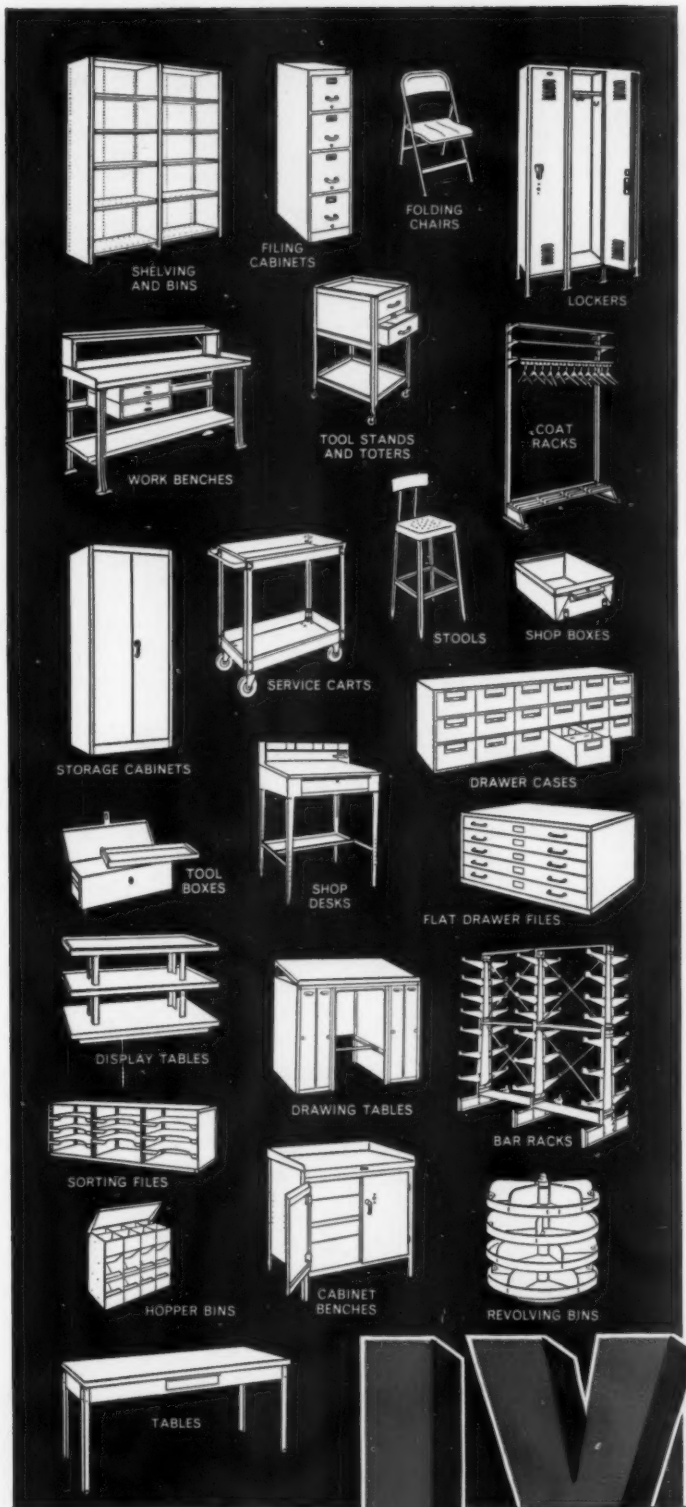
1958 Officers—American Institute of Plant Engineers

S. A. Simonson
President

J. M. Weeks
Vice President

J. J. C. Coffin
Secretary

K. N. Banthin
Treasurer



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On January 8 the Orange County Plant Engineers Club was formed. New AIPE Chapter officers are: T. Hardgrove, president; F. McCormack, vice president; M. Levinson, secretary; H. Duffey, treasurer

Orange County Chapter Organized

Other Plant Engineers Societies Report on Activities

SPARKED BY Jim Weeks, plant engineer of Proto Tools, and Western Regional Vice President of the American Institute of Plant Engineers, the Orange County, California, Plant Engineers Club was formed on January 8. The group was formally accepted as Chapter 38 of the AIPE at their annual convention in Chicago on January 25. A complete report of the AIPE convention appears on page 144.

Officers of the new chapter are: T. H. Hardgrove, Northrop Aircraft, Inc., president; F. P. McCormack, Exchange Lemon Products Co., vice president; M. D. Levinson, Ador Corp., secretary; and H. P. Duffey, Northrop Aircraft, Inc., treasurer.

Pictured at the organizational meeting are, seated, left to right: C. A. Gallaher, Robertshaw-Fulton Controls Co.; C. B. Hill, Northrop Aircraft, Inc.; J. M. Weeks, Proto Tools, (Regional Vice President, AIPE); T. H. Hardgrove and H. E. Bloom, both of Northrop Aircraft, Inc.; J. Roome, Beckman Instruments, Inc.

Standing, left to right: J. R. Hughes, Kirkhill Rubber Co.; T. W. Menzies, Great Western Cordage Co.; R. C. Eschbach and M. D. Levinson, both of Ador Corp.; C. W. Walker, Byron Jackson Electronics; H. P. Duffey, Northrop Aircraft, Inc.; H. Swenson, Hughes Aircraft Co.; W. Seabaugh, Beckman/Helipot Corp.; and V. Bauer, Anaconda Wire & Cable Co.

Additional members of the chapter include: H. Wood, Fluid Packed Pump Co.; W. H. Slater, Continental Emsco Co.; T. Woodworth, Disneyland; C. B. Lewis, Aerojet-General Corp.; J. Hutchinson, Exchange Lemon Products Co.; R. C. Sullivant, Exchange Lemon Products Co.; and E. Gilbert, Exchange Orange Products Co.

Past presidents of the Pittsburgh Chapter of the AIPE were presented with ruby-studded pins. Left to right, they are: F. C. Williams, 1955; R. P. Crane, 1956; H. T. McBride, 1957; F. A. Yost, 1953; R. W. Hiller, 1953; H. N. Leach, 1954

Pittsburgh

In recognition of their services to the Pittsburgh Chapter, members presented the six past presidents

(Continued on page 239)

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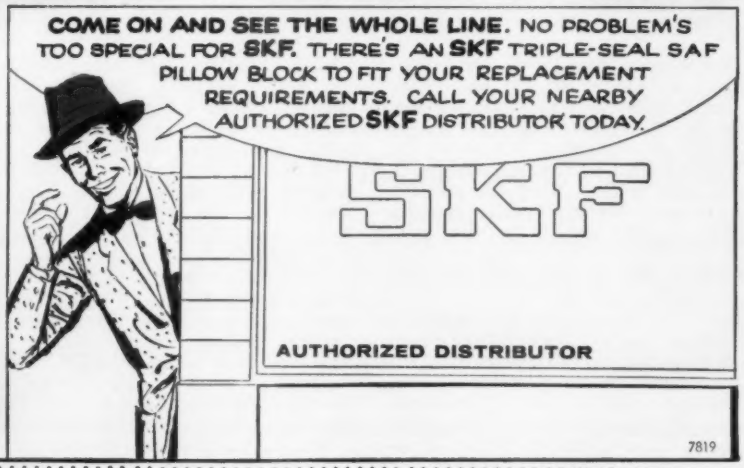
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NEW PLANT CONSTRUCTION —advance information on location, costs

Crossett, Ark.—Crossett Co., subsidiary of Crossett Chemical Co., has announced plans for a major expansion of company's paper manufacturing facilities. Company plans to spend more than $1 million in 1958 to modernize and expand paper mill facilities. Money will be used to modify pulp cooking for bleached food board, more hardwood storage space and increased chemical recovery equipment.

Hawthorne, Calif.—Max Factor & Co. has acquired a 13-acre building site near here for the construction of a large cosmetics plant to cost in excess of $3 million. Construction of the one-story facility in the Hollypark Industrial Center will begin at once and is scheduled for completion by the close of 1958. Manufacturing and warehousing space at the plant will total about 250,000 sq ft.

Lathrop, Calif.—California Ammonia Co. plans to construct a new fertilizer and ammonia plant on local site here. New plant, estimated to cost about $4.8 million, is designed to produce about 100 tons of anhydrous ammonia per day. Engineering contract for design and construction has been awarded to Macco Corp., Paramount, Calif.

Ripon, Calif.—Nestle Co., Inc., 2 Williams St., White Plains, N. Y., plans a major expansion and addition to company's instant coffee plant located here. Work has already begun on the two-story manufacturing operations and the single-story warehouse facility to be completed late this year. Plant with equipment reported to cost in excess of $1 million.

Des Moines, Ia.—Cowles Magazines, Inc., 715 Locust St., has plans under consideration for a large printing plant addition to present facilities here. Amos Emery & Associates, 820 Locust St., is the architect. Cost reported in excess of $1 million. Work will get under way soon for completion sometime early in 1959.

Chicago, Ill.—Witco Chemical Co., 122 E. 42nd St., New York 17, N. Y., plans to enter the phthalic anhydride business and will build a large chemical plant for the production of 20 million pounds of the chemical annually. Company plans to build the new unit next to their present facilities in Chicago's Clearing district. Work will begin soon for completion in early 1959. Scientific Design Co., Inc., 2 Park Ave., New York, N. Y., will design and build the plant.

Calvert City, Ky.—National Carbide Division of Air Reduction Co., Inc., 150 E. 42nd St., New York 17, N. Y., plans to construct a new recovery plant estimated to cost in excess of $2 million. Plant will be built to recover calcium oxide from residue materials produced while generating acetylene from calcium carbide. Construction is already under way and commercial production of the plant is scheduled to start in the fall of this year.

Louisville Ky.—Catalysts and Chemicals Co., has announced the formation of a new company for the manufacture of specialty catalysts for the chemical, petroleum and food industries. Main offices, research laboratories and manufacturing facilities will be located on a three and a half acre site where company has purchased a block of buildings. Remodeling of the 70,000-sq ft building and installation of processing equipment is already under way. Initial investment in buildings and equipment reported to be about $1 million.

Baton Rouge, La.—Esso Standard Oil Co., 15 W. 51st St., New York, N. Y., plans major expansion and improvement program involving the expenditure of $46 million at local refinery here. Included in the projects is the construction of a new cracking unit reported to cost in excess of $26 million for the manufacture of a new high quality gasoline. Work will get under way at once and is scheduled for completion by early 1959.

Sparks, Md.—Diecraft, Inc., 8645 Pulaski Highway, Baltimore, Md., will erect an ultra-modern manufacturing plant on a 19-acre building site on U. S. Route 111. Combined office and production facilities will cover more than 100,000 sq ft on one level, including 11,000 sq ft for office facilities and 89,000 sq ft for manufacturing purposes. Plant will go into production in the spring of 1958. Cost reported to be about $1 million.

Bedford Hills, N. Y.—Arnold Bakers Inc., 10 Traverse Ave., Port Chester, N. Y., plans to build a large bakery plant and office building. Plans now in progress call for bulk handling of flour and liquid ingredients and specially designed production equipment which will combine modern production efficiency with processing methods traditional to the baking industry. Plant and office building will have a total floor area of about 125,000 sq ft. Construction of the plant will begin soon for completion early in 1959. Cost of plant, land and equipment reported to be in excess of $1.5 million.

Buffalo, N. Y.—Bell Aircraft Corp., plans to construct a large addition to its main plant here. New building with a floor area of 220,000 sq ft will be erected at the east end of company's existing plant. Construction will get under way at once for completion by the fall of the year. Plant with equipment reported to cost in excess of $2.5 million.

Gastonia, N. C.—Northwest Plastics, Inc., 63 Plato Ave., St. Paul 1, Minn., plans expansion of company's manufacturing facilities here. Plant is engaged in the manufacture of electrolytic condenser enclosures for the electronics industry. Construction of the new addition, which will double the manufacturing area, will get under way at once for completion late in 1959. Cost of addition with equipment reported to be in excess $225,000.

Shelby, N. C.—Pittsburgh Plate Glass Co., Fiber Glass Division, 1 Gateway Center, Pittsburgh, Pa., plans to construct a new fiber glass plant on a site about five miles from here. Ground has already been broken for the new plant, scheduled for completion by late 1959. Plant will produce all known types of continuous yarns now being manufactured by the fiber glass industry. New facility with necessary equipment will represent an investment in excess of $20 million.

Marietta, O.—Union Carbide Corp., 30 E. 42nd St., New York, N. Y., plans to construct a new plant here for the production of liquid epoxy resins and plastics. New facility will be operated by the Bakelite Division of the company and will have a rated capacity of 15 million pounds annually. Work on the new plant is expected to get under way soon for completion by early 1959.

Wooster, O.—Diebold, Inc., 828 Mulberry Rd., Canton, O., plans to construct a large 40,000-sq ft addition to company plant here. Ground for the new facility has already been broken and preliminary construction work is under way. Addition will represent a major part of the $500,000 expansion program at the Wooster plant of Record Files, Inc., a wholly owned subsidiary of Diebold, Inc. Plant will be completed in the spring of 1959.

Marcus Hook, Pa.—Sinclair Chemicals, Inc., a subsidiary of Sinclair Oil Corp., 600 Fifth Ave., New York, N. Y., has announced a program to expand company's petrochemical activities by marketing high purity propylene, the basic raw material required for the manufacture of a new plastic material. Propylene will be produced in a new petrochemical plant.

Dallas, Texas—Gaylord Container Corp., Division of Crown Zellerbach Corp., 343 Sansome St., San Francisco,

(Continued on page 240)

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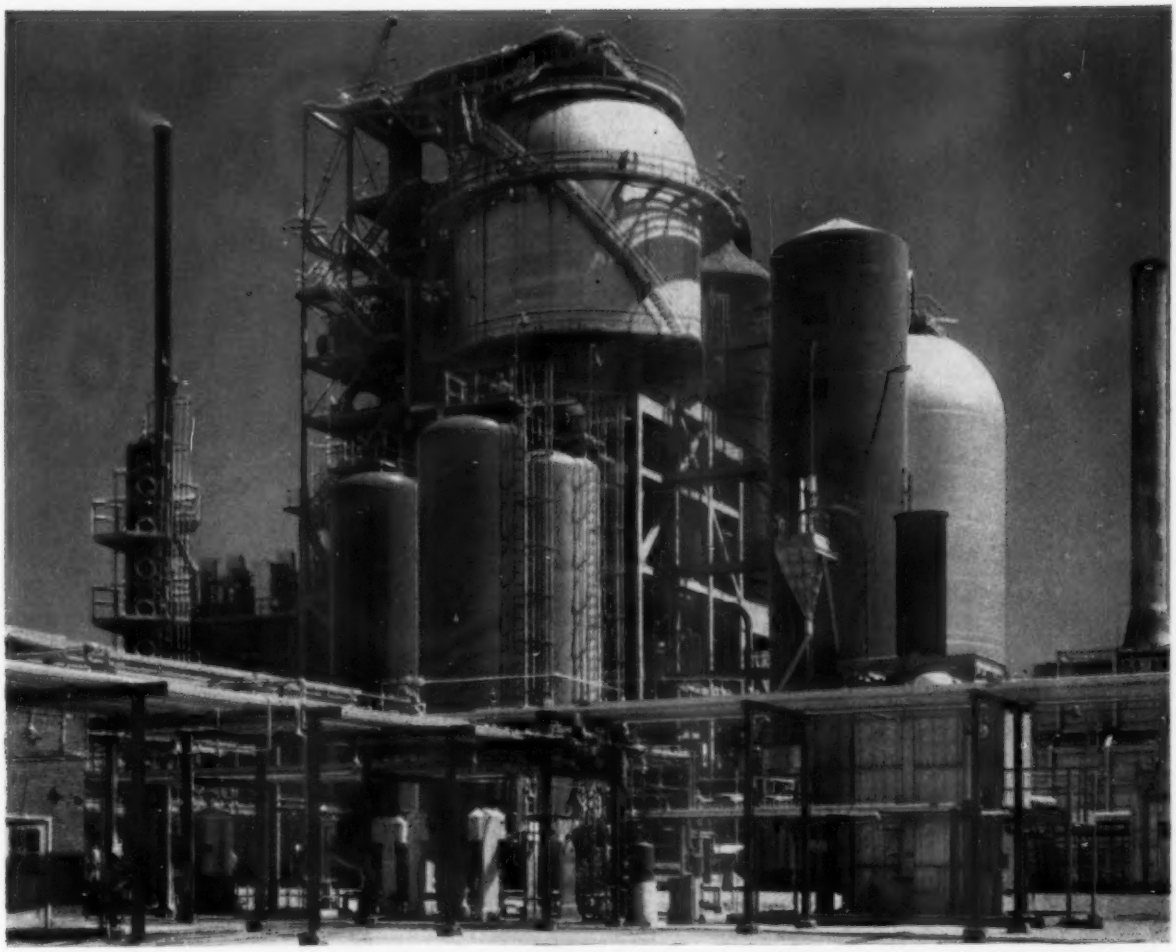

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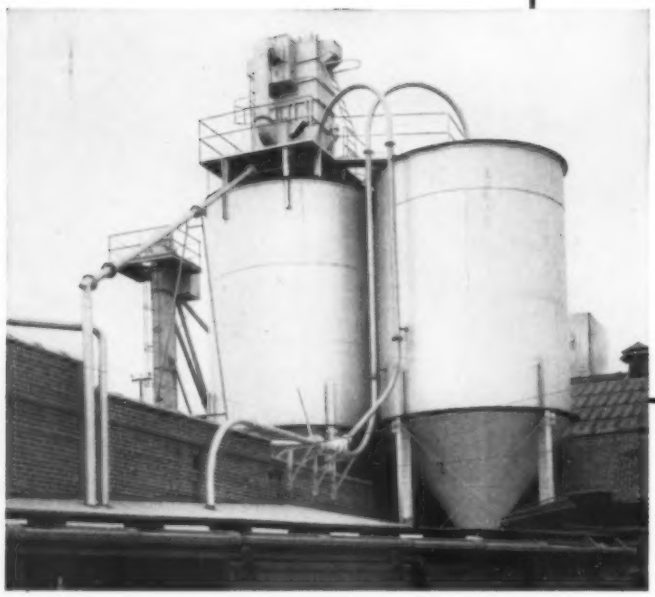
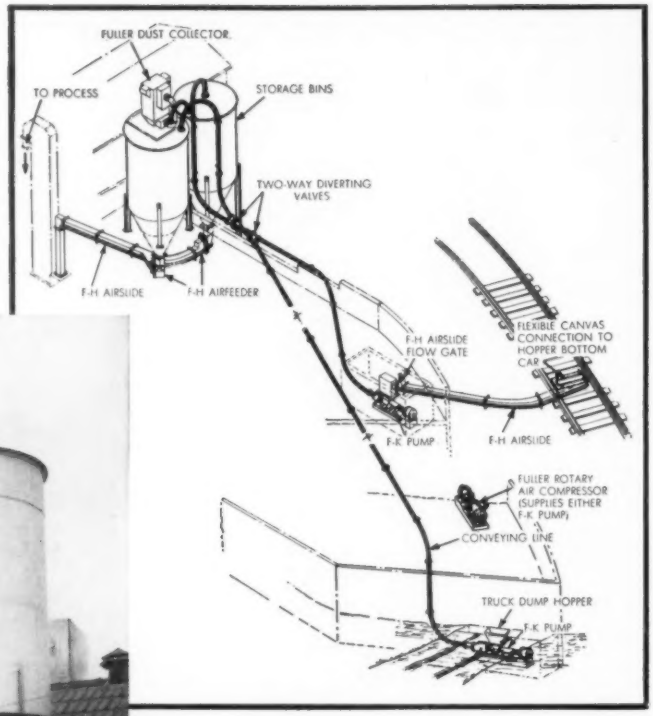




Unloading and Conveying System By FULLER--- Pays Off In Lower Operating Costs for *Certain-teed*

A few years ago, Certain-teed Products Corporation decided to find, if possible, more economical methods of operation in its York, Pa. plant. One problem given serious consideration was the handling of incoming limestone and slate filler dust received in bags, requiring costly, manual labor, resulting in breakage of bags with consequent loss of material and a dusty condition in the plant.

Together, Certain-teed and Fuller engineers made studies of their layout and came up with a solution—a combination of the Fuller-Kinyon Conveying System and F-H Airslides®.

Two Fuller-Kinyon Pumps are used. One conveys limestone dust from hopper-bottom cars, utilizing the Airslide to convey from cars to the pump located in a pit in the plant. This pump conveys to either one of the two storage bins . . . efficient, clean, rapid transfer from cars to storage. The other pump handles the slate dust, delivered in trucks, also conveying to storage. Withdrawal of either material from storage bins is accomplished with Airslides, which discharge to an elevator delivering to process.

Air for the pumps is supplied by a Fuller Rotary Single-stage Compressor, having a capacity of 482 c.f.m. at 20-lb. pressure. Low-pressure air, for the Airslides, is supplied by a small blower.

It is reported that the savings realized by the use of this Fuller system has paid for the installation in less than two years of operation.

Possibly your materials handling is antiquated and costly, which could be remedied by a comparatively small investment. Fuller's 30 years experience in pneumatic conveying of dry bulk materials can very well bring about substantial savings in your plant's operation. Why not write today for further information? No obligation at all.

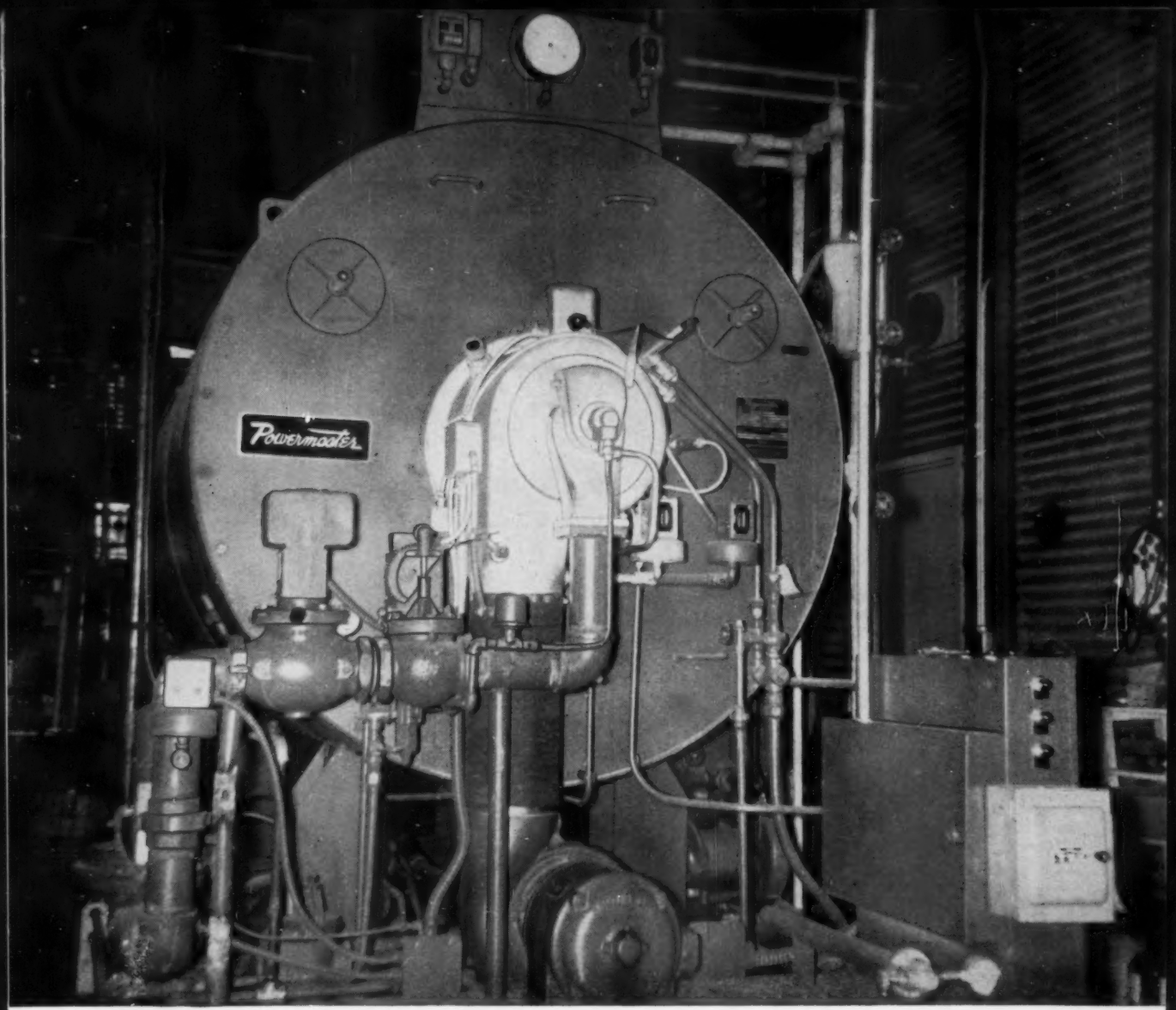
FULLER COMPANY GENERAL AMERICAN TRADE MARK

Fuller
. . . . pioneers in harnessing AIR

G-170
4424

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • San Francisco • Seattle

For more facts circle 568 on Reply Card



Powermaster® BURNS 56% LESS FUEL...SAVES OVER $3500 A YEAR FOR LAUNDRY & DRY CLEANER

This 125 hp, 125 psi, gas-fired *Powermaster* Packaged Automatic Boiler has been more than paying its own way in fuel savings since installation. How is it able to provide such outstanding performance? . . . Because *Powermaster* burner design gives infinitely variable combustion control that instantly responds to load changes. This provides high fuel economy and eliminates much maintenance due to incomplete combustion.

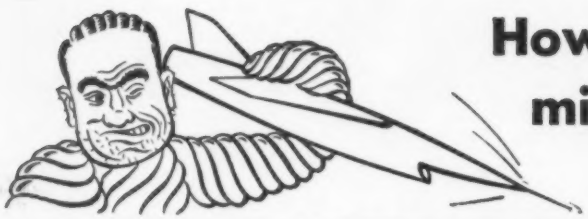
This unit is operating in an Omaha laundry and dry cleaning plant and has saved its owner on maintenance costs in addition to $3505.39 in cold, hard cash for 12 months' fuel.

How much do you think you could save with a *Powermaster?* Chances are that you'll save more than you expect. Most new *Powermaster* owners do. For some examples, write today for latest Bulletin.

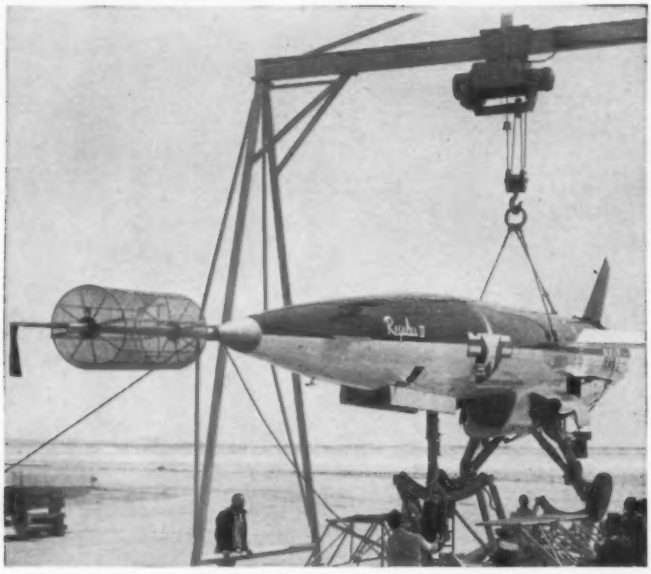
Powermaster®
PACKAGED AUTOMATIC BOILERS
Sizes to 500 hp; pressures to 250 psi
Builders of Dependable Boilers Since 1885

ORR & SEMBOWER, INC.
Morgantown Road, Reading, Pa.

For more facts circle 569 on Reply Card



How Tuffy Slings move mighty Regulus Missiles



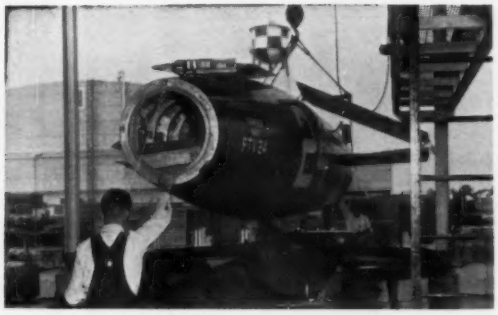
Regulus II gets a lift with Tuffy Slings. This long-range supersonic jet-powered missile is designed for launching from submarines, aircraft carriers, cruisers and shore bases. Test and training versions are equipped with landing gear so they may be recovered after each flight saving taxpayers millions of dollars.

America's intercontinental ballistic missile is still in the future, but the U. S. Navy has intercontinental assault capability today in the combination of submarine and the Regulus I and II guided missiles.

The Chance Vought Regulus I is a fully operational missile that can deliver an atomic warhead more than 500 miles, anywhere in the world. The Regulus II, soon to be operational, has already flown at supersonic speeds and altitudes of more than 50,000 feet.

As the pictures here show, Tuffy Slings are entrusted with the handling of these mighty missiles. Tuffy Slings are used all along the line of production and delivery.

The same combination of strength and flexibility that made Tuffy Slings the choice for this momentous job is yours in Tuffy Slings for every sling use. You get the same machine-braided fabric that resists kinking and from which kinks that do occur are easily removed without material damage. You get the same Tuffy pressed-on ferrule that gives the eye-splice 100% the strength of the fabric. For longer sling life, greater efficiency and safety, get in touch with your Tuffy distributor.



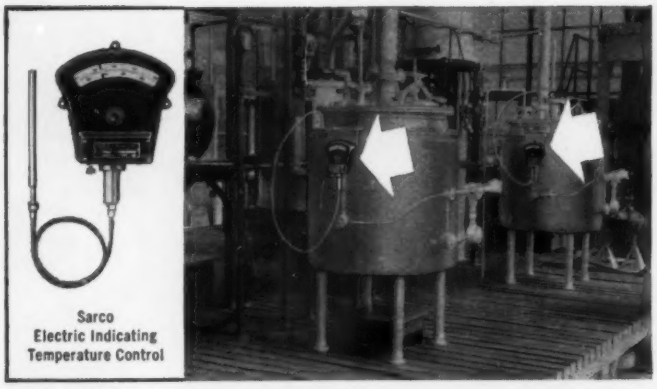
Tuffy helps "can" a missile: Regulus I is shown here being loaded into shipping can with Tuffy Slings. The weight of the missile is classified, but we can say that the weight of the shipping can lid, shown in lower picture, is 3,500 lbs.

Lowering Regulus I onto a submarine, Tuffy Slings are again part of the picture. The fact that such a valuable and vital weapon is entrusted to Tuffy Slings is one of the finest testimonials to Tuffy quality, dependability and safety.

Write today for your copy of
FREE TUFFY SLING HANDBOOK
Full sling data and specifications plus complete rigger's handbook.

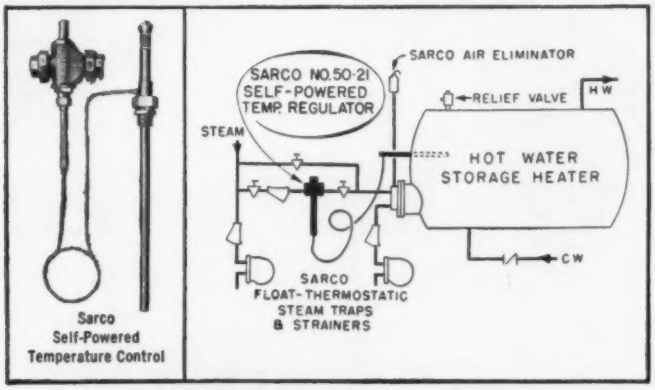
union Wire Rope corporation
SUBSIDIARY ARMCO STEEL CORPORATION
2272 Manchester Ave. **Kansas City 26, Missouri**
Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.
For more facts circle 570 on Reply Card

End uncertain temperature control this simple low-cost way



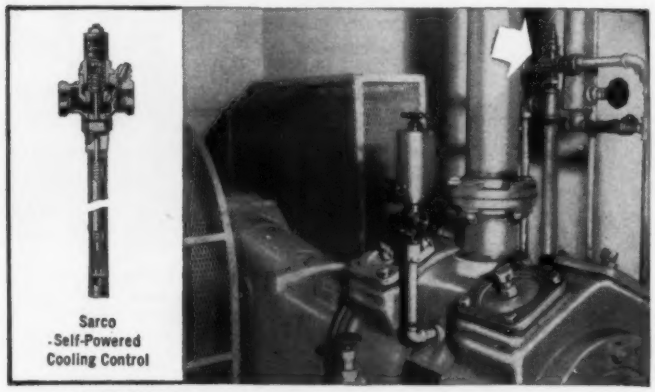
Sarco
Electric Indicating
Temperature Control

STILLS – jacket water temperature of stills held to within ± ½°F. *Other typical applications* – kettles, sterilizers, chemical tanks, plating tanks, processing vats, etc.



Sarco
Self-Powered
Temperature Control

HOT WATER STORAGE HEATER – desired water temperature is automatically maintained. *Other typical applications* – dryers, oil storage tanks, kilns, heat exchangers, etc.



Sarco
Self-Powered
Cooling Control

COMPRESSORS – controls temperature of cooling water, prevents overcooling and undercooling in compressors, aftercoolers and intercoolers. *Other typical applications* – small engines, condensers, ball mills, water-cooled bearings, lubricating oil coolers, etc.

SARCO Automatic Temperature Controls

Electric Indicating and Self-Powered

Simple—Dependable Inexpensive

YOU CAN get rid of costly, hit-or-miss manual temperature control . . . without investing in expensive equipment.

These Sarco Automatic Controls are simple, inexpensive, dependable. They're ideal for hundreds of temperature regulating jobs . . . all but the few specials that call for costly, elaborate controls.

Electric Indicating Controls by Sarco are simple, sensitive . . . perform many of the functions of much more elaborate recorder-controllers, at fraction of their cost. Responsive to temperature changes of ± ½°F. Cost . . . only about $100.

Sarco Self-Powered Controls need no outside power source. Self-contained. Packless. ½" size temperature controller . . . only about $100. ¾" size cooling control...only about $39.

Users of Sarco Controls include Colgate-Palmolive, Sinclair Refining, Swift, Ingersoll-Rand and hundreds of others.

WRITE FOR BULLETINS

No. 1025 – Electric Indicating Temperature Controls
No. 620 – Self-powered Temperature Controls
No. 710 – Self-powered Cooling Controls

Sarco Company, Inc., 635 Madison Avenue, New York 22, New York

2234-B

SARCO

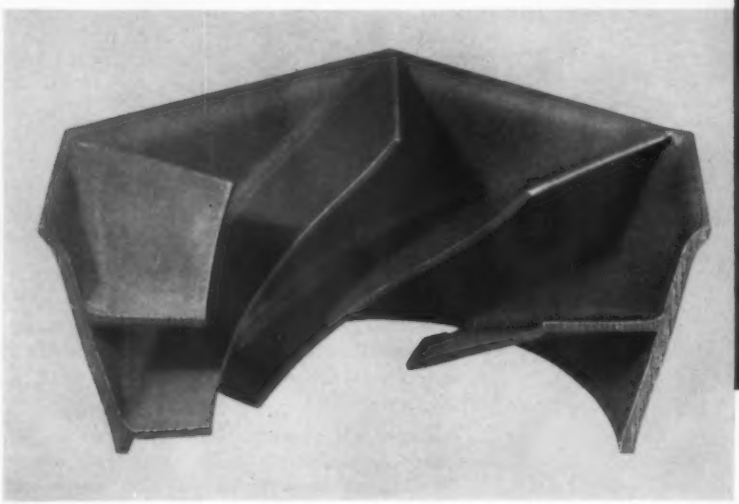
Automatic Temperature Control

ELECTRIC INDICATING AND SELF-POWERED TEMPERATURE CONTROLLERS • STEAM TRAPS • STRAINERS

For more facts circle 571 on Reply Card

HAGAN DUST COLLECTOR CUTS COSTS

...of air pollution control
...of product recovery



The Hagan Aerostatic is the only mechanical dust collector with Selective Particle Acceleration. This unique feature increases efficiency so that it approaches that of electrostatic precipators, and reduces tube erosion to the vanishing point.

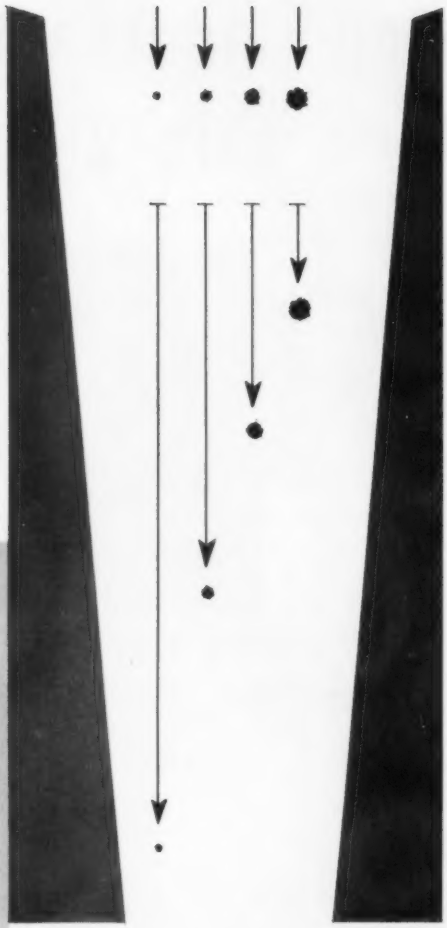


Diagram shows how Selective Particle Acceleration works. Venturi effect of individual inlets accelerates gases on a 6 to 1 ratio. The larger, most abrasive particles pick up the least speed —smaller particles are accelerated the most. All are efficiently separated, but wear on tubes is sharply reduced.

Here are the facts on SELECTIVE PARTICLE ACCELERATION:

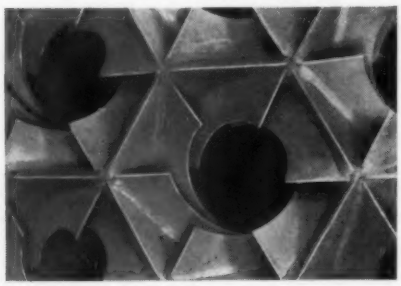
The patented, spiral inlet vane ports have a decreasing cross-sectional area—in effect—a venturi. Gases moving through the ports increase to 6 times their velocity within a space of only three inches.

Small particles (1 to 10 micron range), having very little inertia, are accelerated rapidly, approaching stream velocity.

Larger particles, with more inertia, pick up speed more slowly. They are collected with the same high efficiency, but at low velocity.

Result—the full range of particle sizes are efficiently collected, but the larger and more abrasive particles move at speeds that reduce abrasion drastically.

Write for Descriptive Bulletin MSP 124 A. It contains a complete description of the economical and efficient Hagan Aerostatic Dust Collector.



Detail of tube assembly. Note Hexagon shape of tops—there are no flat surfaces, so it is impossible for dust to accumulate and clog tubes.

HAGAN CHEMICALS & CONTROLS, INC.

HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

For more facts circle 572 on Reply Card

Three Rust-Oleum DIFFERENCES that save you time, money and metal!

GOES ON FASTER

No tedious surface preparations usually required — just scrape and wirebrush to remove rust scale and loose rust — then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust.

STOPS RUST

Rust-Oleum's *specially-processed* fish oil vehicle works down through the rust into the tiny, microscopic pits in the bare metal where it drives out air and moisture to *stop rust.*

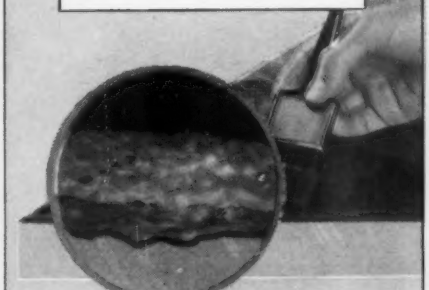
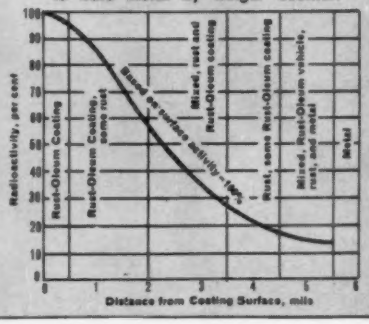
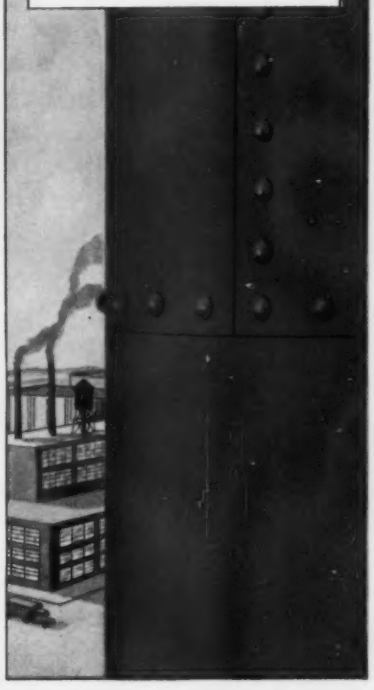


Chart shows results of tracing radio-activated Rust-Oleum through rust to bare metal by Geiger Counter.



LASTS LONGER

Applied over rust, Rust-Oleum lasts longer for the *over-the-years protection* you need. It resists sun, salt water, salt air, fumes, heat, humidity, moisture, weathering.



These are just a few of many important *differences* that separate Rust-Oleum from ordinary coatings. When you consider that Rust-Oleum covers approximately *30% more area,* depending upon surface condition and porosity . . . and the fact that Rust-Oleum finish coatings, with the same fish oil vehicle, are available in nearly every color for *double protection* . . . it's just good, common sense to use Rust-Oleum. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts.

RUST-OLEUM®

STOPS RUST!®

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

ATTACH TO YOUR LETTERHEAD — MAIL TODAY

Rust-Oleum Corporation
2534 Oakton Street • Evanston, Illinois

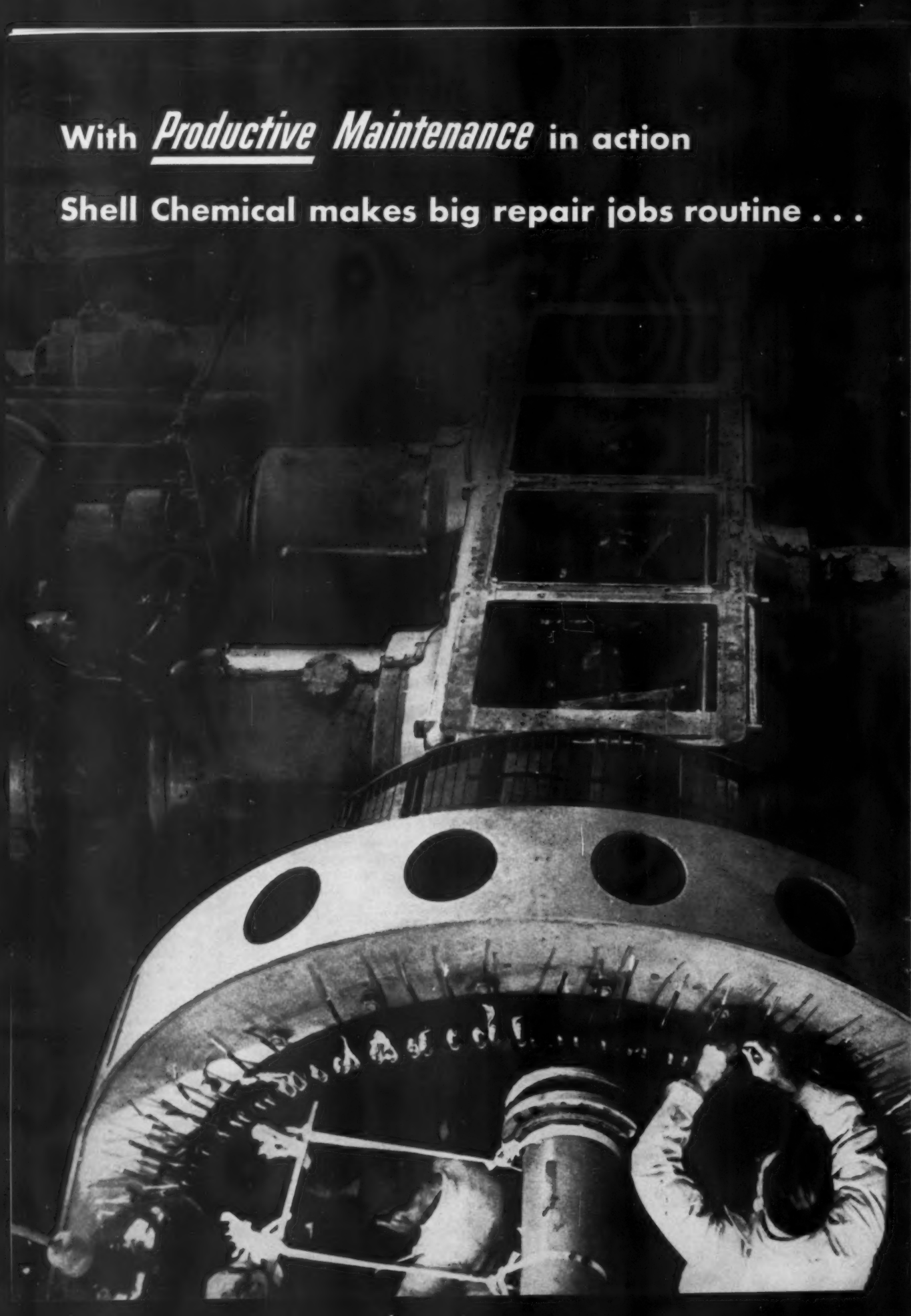
- ☐ Complete literature with color charts.
- ☐ 30-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.

Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

For more facts circle 573 on Reply Card

With *Productive Maintenance* in action

Shell Chemical makes big repair jobs routine . . .



Four key motors totaling 7500 hp overhauled in 96 hours

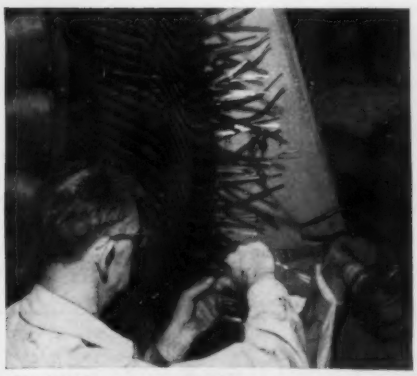
On-the-job overhaul by G-E Service Shop made the difference when Shell had to complete major overhaul in 4 days

At Shell Chemical's plant in Pittsburg, Calif., a recent *Productive* Maintenance project called for the planned overhaul of four large synchronous motors by General Electric's San Francisco Service Shop. Shell's schedule allowed only 96 hours to complete work on all four motors. Thus, fast service was a "must."

General Electric's San Francisco Service Shop, working closely with Shell personnel, scheduled a crew of 24 men to work in two 12-hour shifts. They began with a midnight shift, continued round-the-clock, and ended four days later, *on time.*

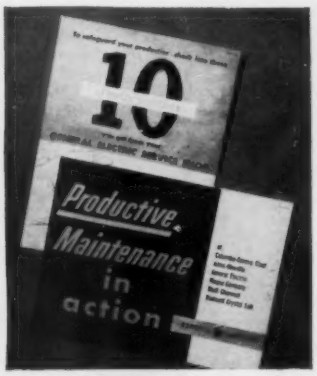
What Shell's Experience Means To You. The next time you schedule major overhauls or any electric repair service call *your* General Electric Service Shop. It is part of a nationwide organization having facilities strategically located to give you complete repair and overhaul service. You get speed, unmatched quality, and experience—*and it's as near as your telephone.*

For additional information, write today for the bulletins shown below, to General Electric Company, Section 690-4, Schenectady 5, N. Y.



MAKING SERIES CONNECTION on one of Shell's 1750-hp synchronous motors required the experienced skill of this G-E San Francisco Service Shop repair specialist.

IMPORTANT PART OF JOB at Shell Chemical was cleaning air ducts with special G-E solvent. Workmen used unique brush to achieve this and wore a mask as a safety measure.



FREE BULLETINS tell how you can make maintenance profitable: GED-3465, "Ten Service Benefits," and GED-3278, "P-M in Action."

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 574 on Reply Card

PROTECTOMOTOR

STAYNEW FILTERS

DOLLINGER

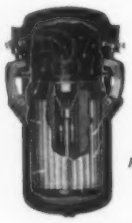
ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

Dollinger makes ALL TYPES of filters as shown on this page, plus special filters for unusual filtration problems. New users of one specific type of Staynew filters often find a second Dollinger filter performs a great, added service in other processes or operations. Dollinger maintains complete engineering, design and laboratory facilities for the development of special filters for new and unusual applications.

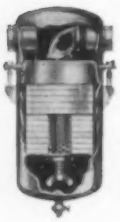
Write for complete information on any of the Staynew filters illustrated. Be sure to specify Bulletin Number or Numbers. Consult Dollinger Engineers on any special filtration problems—no obligation. Dollinger Corporation, 55 Centre Park, Rochester 3, N.Y.

PIPE LINE FILTERS

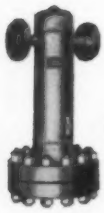
Model CPH
Pipe Line Filter
Bulletin 200



Model CVH (Vacuum)
Pipe Line Filter
Bulletin 200



Model AAPHS
(Absorption)
Pipe Line Filter
Bulletin 200



Model HPH and AHPH
(High Pressure)
Pipe Line Filter
Bulletin 200

LIQUID FILTERS

Model HE (Sump)
Liquid Filter
Bulletin 330

Model ELS (Pressure)
Liquid Filter
Bulletin 300

AIR INTAKE FILTERS

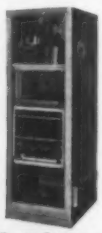
Model IDR
(Ground Level)
Air Intake Filter
Bulletin 100

Model DS (Silencer)
Air Intake Filter
Bulletin 100

Model D (Outdoor)
Air Intake Filter
Bulletin 100

Model C (Indoor)
Air Intake Filter
Bulletin 100

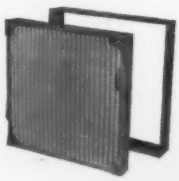
VENTILATION FILTERS



Electro-Staynew
Mist Collector
Bulletin 420

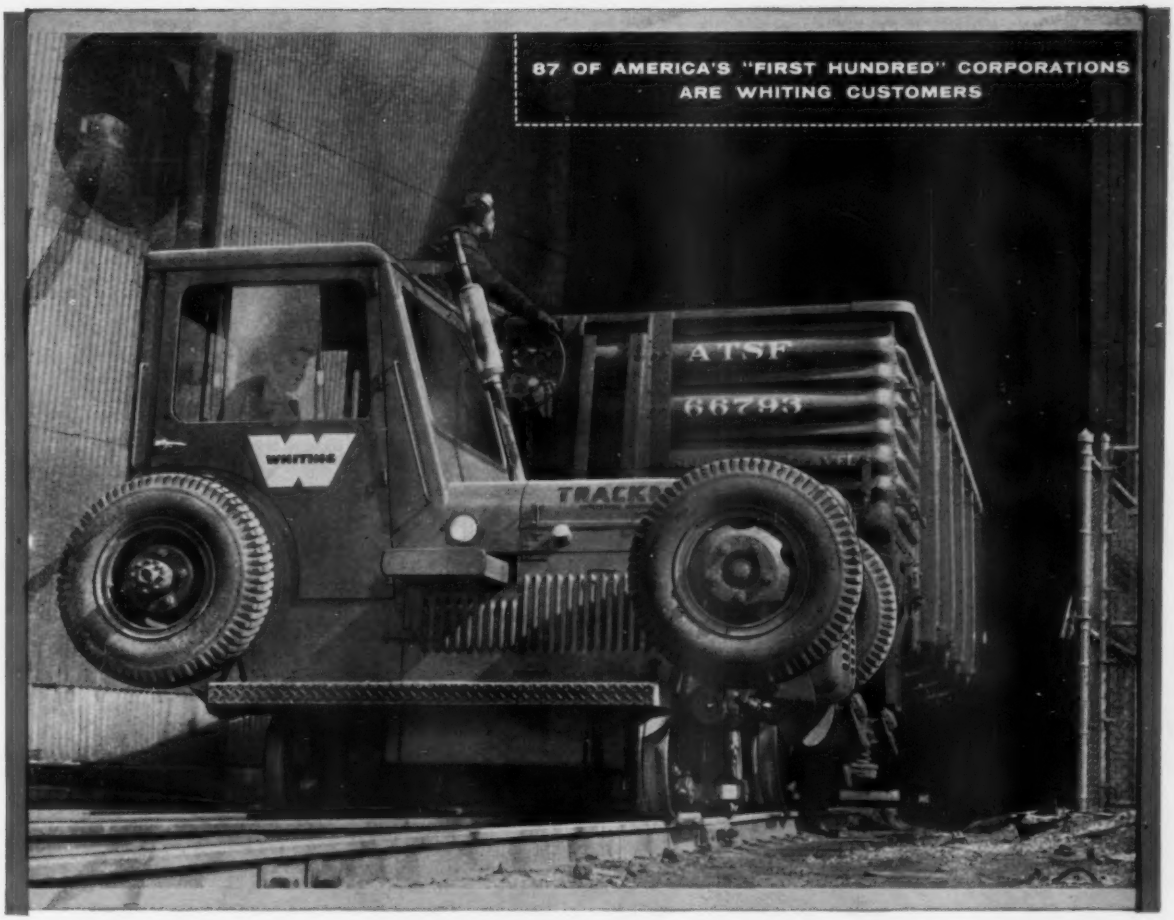
Electro-Staynew
Precipitator
Bulletin 400

Automatic
Ventilation Filter
Bulletin 500



Dry and
Viscous Panel
Ventilation Filters
Bulletin 600 and 700

For more facts circle 575 on Reply Card



Cars move... production flows... costs drop with Trackmobile

Wherever you find Trackmobile, you find things moving. Material flows without a hitch, products progress smoothly through the plant, freight cars are spotted and switched without delay. Inland Steel (above), Westinghouse, International Harvester, and hundreds of other companies use it to save time and money.

Trackmobile is the handiest machine ever invented for switching freight cars. It runs on rail wheels or road wheels—steel to rubber takes only seconds—and it can cross from track to track at any point. It's husky, too . . . built for 24-hour duty . . . pulls several loaded cars on grade or level. Trackmobile pays off with as few as three car moves a day. Get the facts Write now for Bulletin T-122. *Whiting Corporation 15675 Lathrop Ave., Harvey, Illinois.*

WHITING

TRACKMOBILE

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT

For more facts circle 576 on Reply Card

Rolling Mill Designed for the Tough Assignments—Superalloys and Highspeed Steels

A FIRST in the steel industry is a rolling mill that has been developed by the Latrobe Steel Co., Latrobe, Penna., for rolling superalloys and highspeed steels. The superalloys are prime factors in the jet and missile age, and the highspeed steels are the basic cutting material for metalworking.

Described as a 32-in. cogging mill, the new facility is the first to replace the use of forges to hammer or press exceedingly hard steels. It can squeeze ingots as large as 18 in. square, wieghing up to 4000 lb, and can produce billets as small as three inches square or slabs up to 12 in. wide.

Most important of the several radical design features incorporated in the mill is the shape of the rolls. They are diamond-grooved, instead of the usual box or flat rolls of the conventional blooming mill. This type of rolling action tends to distribute the hot deformation much more uniformly, particularly in the center of the ingot being rolled.

The main mill consists of a two-high reversing mill. The main rolls are 32 in. in diameter with a series of the diamond grooves, the largest designed to receive the 18-in. square billets.

Stainless Steel Bars Get Heat Treating, Normalizing in Automatic Line

COMBINING HEAT TREATING and normalizing, a new treating line has been installed at the Detroit Stainless Steel Division plant of Jones & Laughlin Steel Corp. The new facility, which includes two furnaces, makes it possible to supply stainless steel bars in a close range of hardnesses.

Over-all length of the line, which was engineered and installed by the Drever Co., is about 100 ft. The line can treat stainless steel bars in sizes from 1/2 in. to 4-1/2 in. diameter, in lengths up to 30 ft.

After the bars come from the rolling mill, they are placed in the hardening furnace, which is a gas-fired unit capable of heating the bars to 1900 F. The bars are conveyed through the hardening furnace by a walking beam type hearth and then discharged automatically by a roll drive into a bath of 150 F quenching oil.

After 20 to 25 minutes in the oil, the bars are lifted out of the bath by a chain conveyor and fed into the tempering furnace. Time in the furnace varies from 1/2 hour to 4-1/2 hours, depending upon the size of the bars. Conveyed through the furnace by endless alloy chains, the work is heated to temperatures up to 1400 F, depending upon the grade and desired hardness range.

Stainless Steel Rolled in a "Sandwich" Comes Out Wide and Long

AS THE PRODUCT of a "sandwich" rolling process developed by U.S. Steel, the feasibility of producing stainless steel sheets up to 90 in. wide has been demonstrated. This is nearly twice the width of light-gage stainless and alloy sheets now being made by conventional methods.

These wide sheets can reduce the over-all weight of aircraft and missiles by eliminating many of the joints and seams now necessary in the fabrication of airframe parts and skins from narrower sheets.

The new method consists of sandwiching stainless or alloy steel plates between two heavier plates of ordinary carbon steel, closing the assembly with welded-in side and end bars, heating the "sandwich" and rolling it.

A typical experimental sandwich rolled at U.S. Steel's Homestead District Works contained four 12 per cent chromium stainless plates, each 5/16 in. thick. These were enclosed in carbon steel cover plates, each one inch thick, so that the assembly, after welding, was about three inches thick. The sandwich was heated by conventional methods and rolled down to a plate 3/8 in. thick, 100 in. wide and 250 in. long.

This amounted to a total reduction of about 90 per cent with the original stainless plates that were 5/16 in. thick rolled to a nominal thickness of 0.033 in. each. When the expendable end and side bars were sheared off to open the assembly, the stainless sheets measured 90 in. in width, and 230 in. in length.

SEND FOR FOSTER's NEW TRACK INSPECTION KIT

To help you simplify and improve your industrial track maintenance

A new, easy-to-use guide—FREE

This brand new Foster Track Inspection Kit is yours for the asking—it will help *anyone* avoid costly track breakdowns. In one complete package we have pictured and listed all the elements of a modern industrial track installation, and provided the guides for you to check as to level of maintenance. Over 55 years of industrial track experience are now condensed—for your handy use—into this valuable free kit. It will earn a special welcome among plant engineers as a handy guide to help them improve their track maintenance programs, but *anyone* can use it. Send today for your free copy by writing the Foster office nearest you . . . or write to L. B. Foster Co., Box 1647, Pittsburgh 30, Pa.

SEND FOR VALUABLE KIT #PE-3 —IT INCLUDES:

1. 11¾" x 18¼" heavy card chart with diagrams of various types of industrial track installations.
2. 48 items, identified and described in non-technical terms.
3. Simplified, streamlined report form in sufficient copies to take care of inspecting the average installation.
4. Famous Foster Track Maintenance Manual—16 pages, 8½" x 11".
5. Postage-paid card request form for Foster catalogs and additional track inspection kits.

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For more facts circle 577 on Reply Card

Country's Largest Welded Plate Girders Cantilevered To Support Hangar Roof

SEVEN OF THE LARGEST welded plate girders ever made in this country are being set in place for a new maintenance hangar which United Air Lines is building near San Francisco's International Airport.

The hangar is a double cantilever structure with a three-story concrete core for shops, offices and storerooms. Inclined trusses are employed in a special engineering technique which provides clean design and construction economy. The roof is supported by the plate girders, which rest on the pillars that enclose the central core. Each girder is 365 ft long and weighs 125 tons.

Scheduled for completion in the fall of 1958, the hangar will provide 153,000 sq ft of floor space for line maintenance of aircraft. The building will accommodate two DC-7 Mainliners and four of the DC-8 jet planes that United will be flying. Aircraft will be positioned on the front and rear sides of the core.

Girders for the hangar, which was designed by Skidmore, Owings and Merrill, were fabricated by the Pacific Iron & Steel Corp., Los Angeles.

Little Units, Big Job

STEEL BB'S—35 tons of them—are the shielding in a new "hot cell" at Westinghouse's Materials Engineering Department radiation and nucleonics laboratory.

The cell has half-inch-thick walls of steel plate, spaced 15 in. apart. Between the walls are the bb's, equal to 10 in. of solid steel in their ability to contain radiations.

Use of the bb's makes the hot cell portable, since the shot can be drained through special openings near the base of the walls.

Plastic Keeps Welds Clean

A BUBBLE of Krene cast vinyl plastic, enclosing argon gas in a welding setup, is helping the aircraft industry produce better jet engines. Used as a welding tent, it simplifies the fabricating of titanium.

By filling the welding chamber with an inert gas, oxygen is kept out of the weld, where its presence would result in impurities.

Argon-holding welding tents used by Pratt & Whitney Aircraft, Div. of United Aircraft Corp., are about four feet high and four feet in diameter.

Digital Control Programming Takes Over Steel Strip Production at J & L

BRINGING THE GOAL of true push-button steel production into reality, a fully automated mill is in operation at Jones & Laughlin Steel Corp.'s Aliquippa, Penna., Works. Called Prodac, for Programmed Digital Automatic Control, the new control equipment will direct the actions of a 6000-hp universal reversing roughing mill that will feed a six-stand continuous hot strip mill. Prodac was designed and manufactured by Westinghouse Electric Corp.

To start a rolling schedule, the operator brings the slab coming from the primary mill onto the entry table and places a corresponding IBM punched card containing information on the requirements for that slab into a reader unit. The card passes through the reader, which stores the information to direct each stage of the roughing operation sequence automatically.

A single punched card will supply: 1. Horizontal roll opening; 2. Vertical roll opening; 3. Speeds of the mill tables and feed roll; 4. Draft compensation; 5. Direction of the mill; 6. Scale breaking edger adjustment; 7. Scale breaker edger side guards; 8. Scale breaker edger descaling sprays; 9. Descaling sprays on delivery side of the mill.

The mill itself consists of a vertical scale breaker, a two-high reversing roughing mill with attached edgers, six four-high finishing stands with three individually-driven edgers, and two revolving-mandrel down-coilers.

Installed at a cost of more than $36,000,000, the new facility will be able to roll over 100,000 tons of coiled strip per month. This strip, varying in gage and in widths up to 40 in., will be used primarily in the electricweld and continuous weld pipe mills, and in tin plate manufacture.

Cut costs... without cutting corners! Specify... GEDNEY CONDUIT BODIES

Gedney Conduit Bodies mean lowest installed cost! That's because they are skillfully made of tough, *malleable* iron, then hot-dip galvanized, and finally, they must pass the toughest inspection. Accurate machining and threading assure easiest installation . . . ruggedness assures longest service life!

THE GEDNEY CONDUIT BODY LINE INCLUDES ALL TYPES—SIZES ½" TO 4"

TYPE LB—Threaded—for heavy-wall rigid conduit. Use them with Gedney entrance fittings, straps, clamp backs to get an *entire* conduit system that is hot-dip galvanized.

TYPE FS—Threaded—shallow bodies for heavy-wall rigid conduit. Hot-dip galvanized finish prevents corrosive deposits—means easier installation, longer life.

SCORES OF OTHER GEDNEY FITTINGS are available for every purpose—all carefully designed, manufactured and inspected to assure economical installation and maximum customer satisfaction.

GEDNEY
ELECTRIC COMPANY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

GEDNEY FITTINGS FIT

For more facts circle 578 on Reply Card

Radial Draw Former "Turns Out" Parts for Jet Liner Airframe

A RADIAL DRAW FORMER, largest of its kind, is currently in production turning out belt frames for the Convair 880 jet transport. Built to Convair specifications, the former has a 75-ton capacity tension ram and a 35-ton on-follower, or compression ram. The 150-in. diameter rotary work table makes it the largest ever built.

The machine is mounted over a reinforced concrete-lined pit. It weighs 87 tons and is 75 ft long, 30 ft wide and 12 ft high.

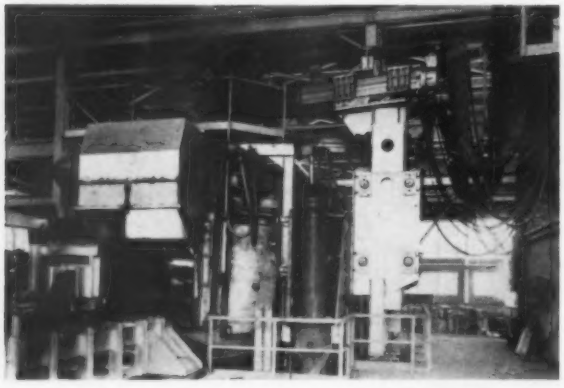
The process, designed to form 75-S aluminum, operates in this sequence: the material is heated to 870 degrees, then lowered by hydraulic elevator into a bath of water for quenching; to preserve its pliability (which would be lost within 30 minutes at room temperature) the metal is placed in a below-zero cold box for storage, to keep it workable until it is formed; it is formed on the draw former; it is hardened by aging at 320 degrees for 24 hours.

Parts that have completed this complete cycle have been given the desired physical properties for their ultimate use.

Electric Furnace for Melting Copper Sets New Highs in Size, Electrical Load

EIGHTEEN FEET in diameter and with a bath capacity of 90 tons of molten metal, the world's largest copper melting electric furnace can continuously produce a ton of high-quality tough pitch copper every two minutes. It has recently gone into operation at the Perth Amboy, N. J., plant of American Smelting and Refining Company.

With a transformer rating of 8000 kva and a maximum rated current of 30,400 amps, the furnace is the world's largest of its type electrically as well as physically. Three 18-in. diameter graphite electrodes, each of which weighs 4000 lb, are positioned hydraulically over the molten metal bath.



At Perth Amboy, Asarco has combined an oil-fired preheating furnace with the electric arc furnace, to use both sources of heat at optimum efficiency. Copper in the form of cathode sheets is heated to 1500-1600 F in a rotary preheating furnace. The heated cathodes are then transferred to the arc furnace where the copper is melted and heated to 2100-2150 F. The molten metal is cast continuously at 2030F.

Accurate control of the electrodes is a major problem. If they are lowered too far, a short circuit results; if withdrawn too far, the arc is snuffed. An air gap of ½ to 1 in. must be maintained at all times, and an extremely sensitive control system is necessary to adjust to ripples of surges in the bath due to charging.

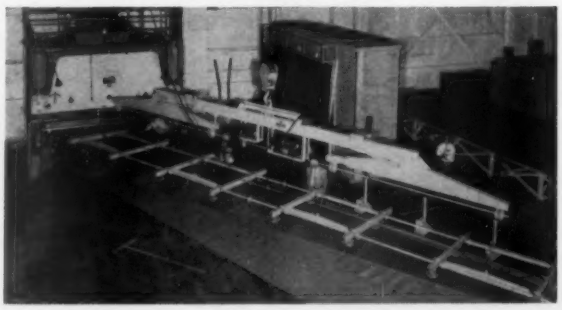
A rotary regulator and hydraulic servo system, designed by the Whiting Corp. and General Electric Co., are providing the necessary control. The electrodes are consumed continuously, and at periodic intervals the power is shut off for electrode addition, which is accomplished by screwing a new section onto the top of the section in the furnace. Except for these additions, and infrequent periods for slagging, door cleaning or adjustment, the furnace can be operated continuously.

Device Uses Multiple Vacuum Cups To Lift Outsize Aluminum Sheets

PRIMARILY USED to handle big taper-rolled aluminum sheets for the DC-8 commercial jet airliner, a vacuum lifting unit is in use at Long Beach Div., Douglas Aircraft Co. The Vac-U-Lift unit transports the skins through the entire sequence of operations from station to station during the forming process.

Raising one of the large aluminum sheets from the deep-freeze storage box (in which they are stored after receipt from the rolling mill) the unit carries the frosted 1250-lb aluminum sheet to a cutting table, to be trimmed to size for the airliner wing skins. The largest sheets are 0.230 thick for the first 175 in., tapering to 0.129 thickness at the thin end.

The vacuum unit is also used to place the wing skin on a vertical rack, so that by positioning the unit on the other side of the rack, a complete turnover of the skin can be accomplished. Handling of the vacuum units themselves can be done by overhead crane, hoist or lift truck.



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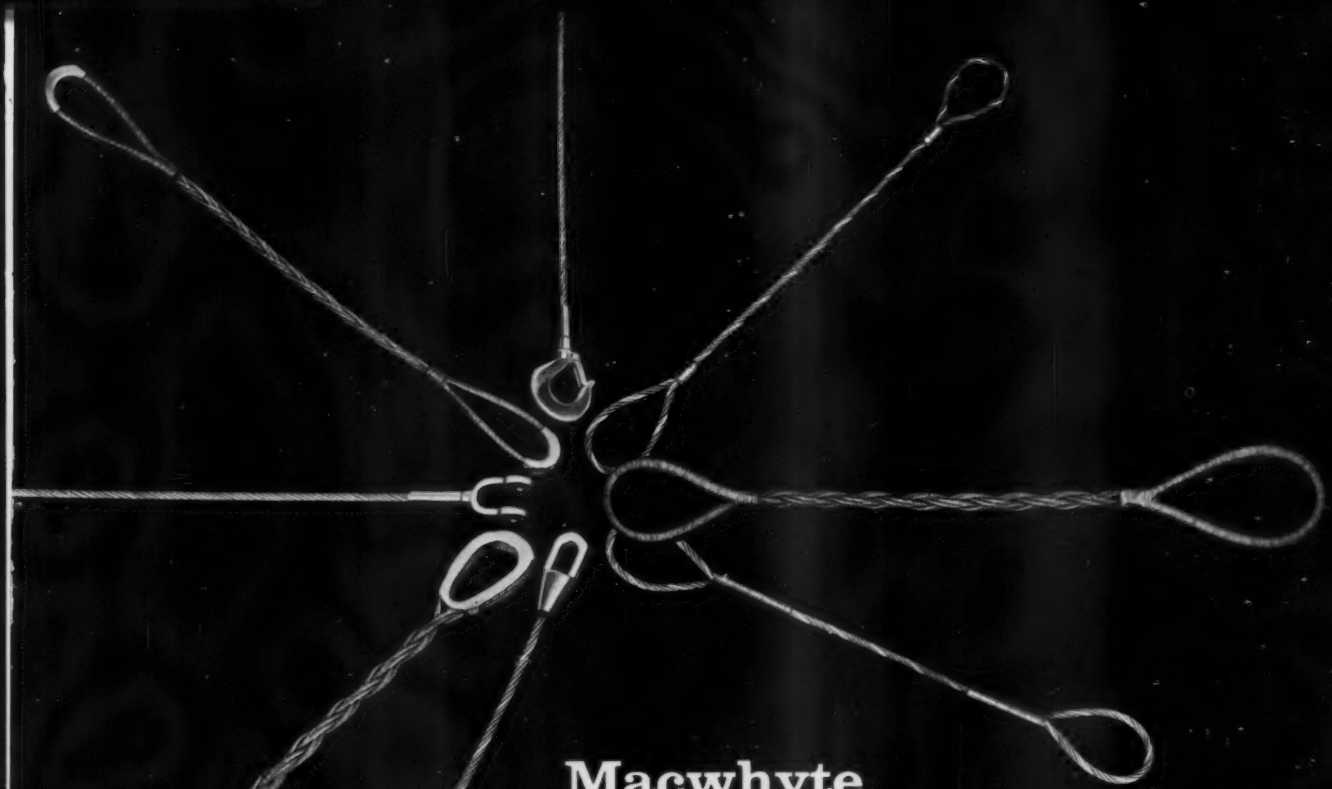

Macwhyte Factory-Formed Slings . . .

speed up your load handling, increase safety and reduce costs

Illustrated here are just a few of the many loop eyes and end fittings you can get on Macwhyte *factory-formed* slings and wire rope assemblies. The right combination for *your* slings enables your riggers to hook onto a load and hoist away in jig-time, and fast handling lowers production cost!

These factory-formed slings are made by wire rope craftsmen. Loop-eyes provide full rated capacity. Special power-swaged "Safe-Lock" fittings are "married" to the wire rope in an indestructible bond that won't pull loose, won't slip — always holds fast.

And buying slings that specifically fit your job means safer, easier, faster load handling.

Every sling user should have this free, 90-page booklet! It's packed with "what-to-use" and "how-to" information. If you don't see the sling you want, let us know. We will make slings to your specifications or design them for you. Ask for Catalog S-8.

MACWHYTE Wire Rope COMPANY

MACWHYTE WIRE ROPE COMPANY
2906 Fourteenth Avenue, Kenosha, Wisconsin

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SPACE ENGINEERING WITH STANDARD UNITS

THESE 25 PARTS are components of a 36 in. wide, 18 in. deep, 7 ft. 3 in. high unit of HALLOWELL Erectomatic closed type shelving with seven shelves.

IN 8 MINUTES 22 SECONDS, both all-welded end sections (beaded front post, back post, and 1-piece side panel), top shelf, base strip, 1-piece back panel, and back panel clips are in place.

IN 2 MINUTES 20 SECONDS, full-depth shelf supports are positioned and shelves located on their respective supports.

UNIQUE LOCKING DEVICES are pressed into place and shelves are ready for loading in just 10 minutes 42 seconds.

Hallowell Erectomatic® Shelving Goes Up Fast, Cuts Erection Costs

Two men assembled 7-shelf closed unit, 7 ft. 3 in. high, in only 10 minutes 42 seconds

Since HALLOWELL Erectomatic goes up faster, you save as much as 40% in erection costs. Time is saved in changing shelf arrangement to meet varying conditions, too. A shelf can be removed independently without tilting, repositioned without unloading. There is no interference with any other shelf. Just release the locks, remove the shelf and its supports, relocate them, and press the locks. It takes only seconds to do the complete job. Form 2257 tells the full story. Ask an authorized HALLOWELL Shop Equipment dealer for your copy. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

SPS Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co., Inc. • Nutt-Shel Corporation • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

For more facts circle 580 on Reply Card

Maintenance and Steam Traps

. . . there's a relationship that goes far beyond trap maintenance alone

Good traps and good trapping have a greater effect on your maintenance costs than does trap maintenance itself. By that we mean that the right traps, properly selected and installed, and with the benefits of a preventive maintenance program, will save far more maintenance dollars than they will cost.

Under the pressure of spiralling maintenance costs, this thought becomes mighty important. Let's take a look at what it involves:

Proper Selection of Steam Traps

1. Be sure it's the right type of trap.

2. Be sure it's sized right and is for the correct operating pressure.

3. Be sure it's first rate in design and construction.

Proper Installation of Steam Traps

1. Install them so they are accessible for inspection and maintenance.

2. Install a test valve.

3. Use a union or unions.

4. Use a shutoff valve or valves.

5. Use a strainer ahead of the trap if dirt conditions are bad.

6. Use a by-pass only where continuity of service is imperative.

7. Standardize inlet and outlet connections.

Preventive Maintenance Program

1. Test trap regularly for proper operation. (Trap size, operating pressure and importance determine frequency.)

2. Inspect internal mechanism at least once a year.

You Get Indirect Benefits As Well

The direct benefits of the plan outlined are pretty obvious — good traps, properly selected, require less maintenance . . . testing and inspection prevents troubles that lead to maintenance.

However, this plan provides indirect benefits which reduce maintenance in other parts of the plant as well:

Good traps save steam and reduce the load (and consequently maintenance) on fuel handling and burning equipment and on ash handling equipment.

Good traps protect the system by eliminating water hammer and preventing the damage it can do.

Good traps discharge carbon dioxide before it can go into solution to form corrosive carbonic acid — less corrosion, less maintenance.

Good traps increase production to reduce the length of time equipment must operate or reduce the amount of equipment needed . . . either way maintenance is reduced.

How to Go About It (The Sales Pitch)

We admit we're prejudiced, but we don't think there is any better way to select steam traps than with the help of the 44 page Armstrong Steam Trap Book. Here in a single source is specific data on the selection and sizing of traps, how to install them for best results, and how to maintain them most economically.

The Steam Trap Book will also give you full information on the design and construction of Armstrong Inverted Bucket Steam Traps that offer these important maintenance-reducing advantages:

1. Armstrong Traps are dependable.

2. Armstrong Traps require no adjustments — go from full load to zero load automatically.

3. Armstrong Traps are self-scrubbing—ordinary dirt conditions can't hurt them.

4. Armstrong Traps have long-life parts — valve and seat are heat treated chrome steel — lever assembly and bucket are stainless steel.

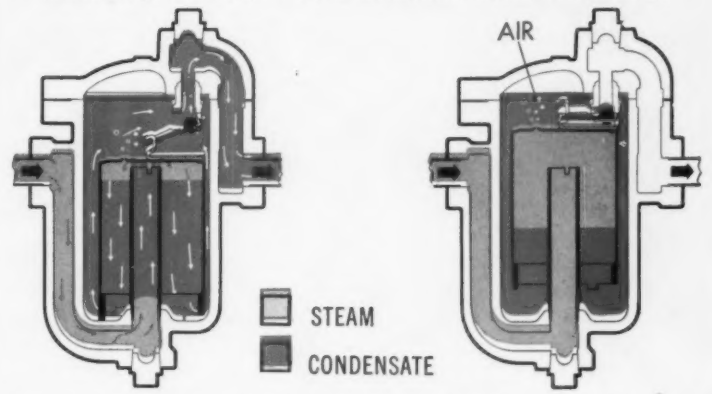
5. Armstrong Traps have water sealed valves to minimize wire drawing and erosion.

Ask for your copy of the Steam Trap Book—there is no obligation. Then test Armstrong Trapping. If you are not completely satisfied with the results, you can return the traps for a full refund of the purchase price. You can't lose much that way. Call your local Armstrong Representative or Distributor, or write

Armstrong Machine Works
9124 **Maple Street**
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

HERE'S THE STEAM TRAP DESIGN THAT CAN REDUCE YOUR MAINTENANCE PROBLEMS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

For more facts circle 581 on Reply Card

Let us demonstrate — right in your plant or shop — how 'Budgit' Hoists can make your lifting problems disappear.

Free Demonstration

IN YOUR PLANT OR SHOP

Make us prove how 'Budgit' Hoist can solve YOUR lifting problem

Your local 'Budgit' Electric Hoist distributor now makes you this special offer:

You pick the spot where you need help in lifting.

Call your 'Budgit' Hoist distributor. (You'll find him listed in the yellow pages under 'Budgit'.)

He'll bring a 'Budgit' Hoist to the spot you name, hang it up, plug it in, and show you how 'Budgit' can make your lifting job fast, safe and effortless.

No obligation. Demonstration takes only minutes. All you need is a place to hang the Hoist and an electrical outlet (or 12-volt battery).

HANDLES ANY LOAD

The 'Budgit' Electric Hoist can handle any kind of load up to 2 tons: machinery units, castings, crates, dies, pipe . . . anything. Works indoors or out. Has two automatic brakes for extra safety. Either alone can hold the load.

One-hand control leaves your other hand free to guide the load. Hairline stops and starts let you "spot" your load gently within 1/100th of an inch.

AC and DC models. Also 12-volt battery models for use on trucks. Prices start at $159.

Call your Shaw-Box distributor today or write for your copy of Bulletin 402 and 404. No obligation of course.

58A-2

MAXWELL MANNING MM&M MOORE INC. TRADE MARK

'Budgit'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

362 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

For more facts circle 582 on Reply Card

For more facts circle 583 on Reply Card——→

Do you worry about power distribution costs

WHILE YOU'RE AT LUNCH?

If you're figuring costs of that new power distribution system — either in an old building or that new one you're planning — here's one way to help you keep costs down and assure you of dependable service — specify and use Rockbestos A.V.C. (Asbestos, Varnished Cambric insulated) Interlocked Armored Cable.* Here's how:

- You save important dollars by eliminating the need for costly conduit or ducts.
- It cuts installation time and permits quick, easy repairs.
- Rockbestos A.V.C. Interlocked Armored Cable gives you more current capacity than cable in conduit or other armored cable.
- It's easily installed on racks or hangers beneath the ceiling or next to walls.
- It can be installed up, down or around walls, beams or posts.

Get all the details on Rockbestos A.V.C. Interlocked Armored Cable. Write now for catalog which gives complete specifications and application data.

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN 4, CONNECTICUT | NEW YORK, CLEVELAND, DETROIT, CHICAGO, PITTSBURGH, ST. LOUIS, LOS ANGELES, NEW ORLEANS, OAKLAND, SEATTLE

*Single conductors are standard N.E.C. Type AVA power cables.

ROCKBESTOS

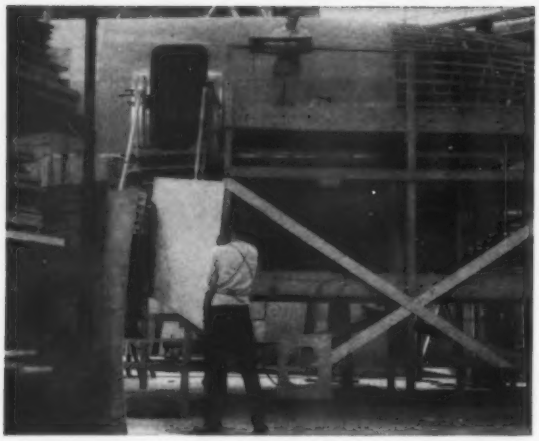
A. V. C. Interlocked Armored Cable

For New Buildings, Expanding Existing Circuits, Relocating Old Circuits

DURABLE

Exterior plywood filter frames last longer, cost less

One piece fir plywood filter frames used with electrolytic fluids in powdered metal production cost 40 per cent less than conventional lumber frames. Frames, shown here being cleaned, cut fabrication time and costs and also eliminate joints and fastenings which might work loose. Plywood prevents frames from racking out of shape. Despite the fact that they weigh much less and take up only half as much room as the bulkier lumber frames (shown at left), they stand up longer under constant immersion in the highly acid solutions used in the electrolytic process.



WORKABLE

Fir plywood simplifies complex aircraft mock-ups

Fir plywood is the basic raw material used in this full-size mock-up of Douglas Aircraft Company's giant DC-8 jet transport. Over 180 feet long, this plywood prototype permits engineers to make most efficient placement of components. Cross-laminated for two-way strength, plywood is easy to cut to intricate shapes, machines to tight tolerances and bends easily to required curvatures. Panels are light, cover big areas fast. Moving gears, control panels, wheels and other parts in addition to fuselage skin are mocked up in plywood.

LOW COST

Plywood templates help Ryan cut fabrication costs

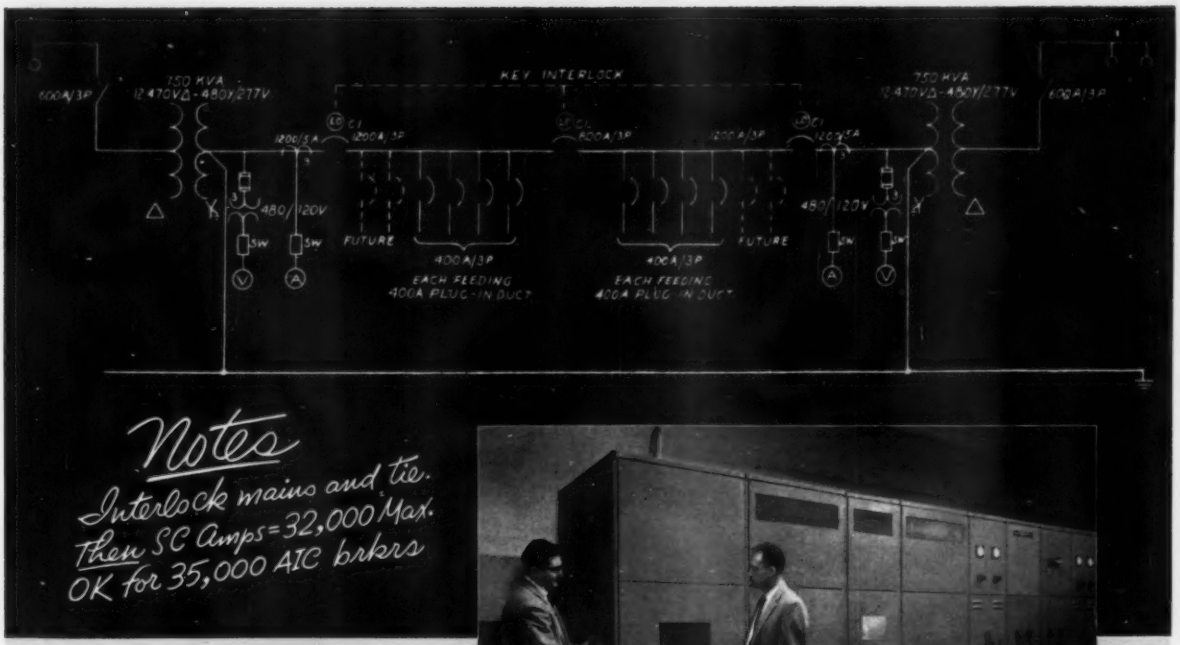
Ryan Aeronautical Co., San Diego, saves hundreds of dollars each month by an ingenious use of fir plywood templates for photographic layouts. Actual size plywood shapes of parts to be obtained from metal sheets are arranged to determine optimum cutting layouts. Pictures are taken with a polaroid camera and data is given to production crews within minutes after the layout is approved. Aside from being faster and more accurate, use of these low cost plywood templates has cut Ryan's output of scrap by about 25 per cent. Templates also help fair plaster mock ups and are used for routing tool components during cutting operations.

FIR PLYWOOD

Letters DFPA on panel back or edge attest manufacture and inspection under industry-wide quality control program. Individual grade-trademarks are specification guides to the right type and grade and the *right* quality.

FOR INFORMATION about specific plywood uses, or for basic specification-use data, write (USA only) Douglas Fir Plywood Association, Dept. 180, Tacoma 2, Washington.

For more facts circle 584 on Reply Card



In Unit Substations COORDINATED DESIGN

Cuts Costs and Saves Space!

Square D designs and builds a complete line of substations for any application, indoor or outdoor—with dry or liquid-filled transformers—with large air breakers or molded case breakers—with motor control units.

A typical example is this 1500 KVA double-ended unit substation, designed to meet the special requirements of a Lexington, Kentucky, plant. Flexibility for future expansion and complete safety without service interruption were essential. The following features are incorporated in the unit:

Main breakers are 1200-ampere air circuit breakers

Feeder breakers used to feed Square D plug-in duct, are molded case breakers

Tie-in breaker is key-interlocked to permit tying units together when operating on one transformer in an emergency

Interrupting capacity of all molded case breakers exceeds the total maximum available short circuit current, including 100% motor contribution

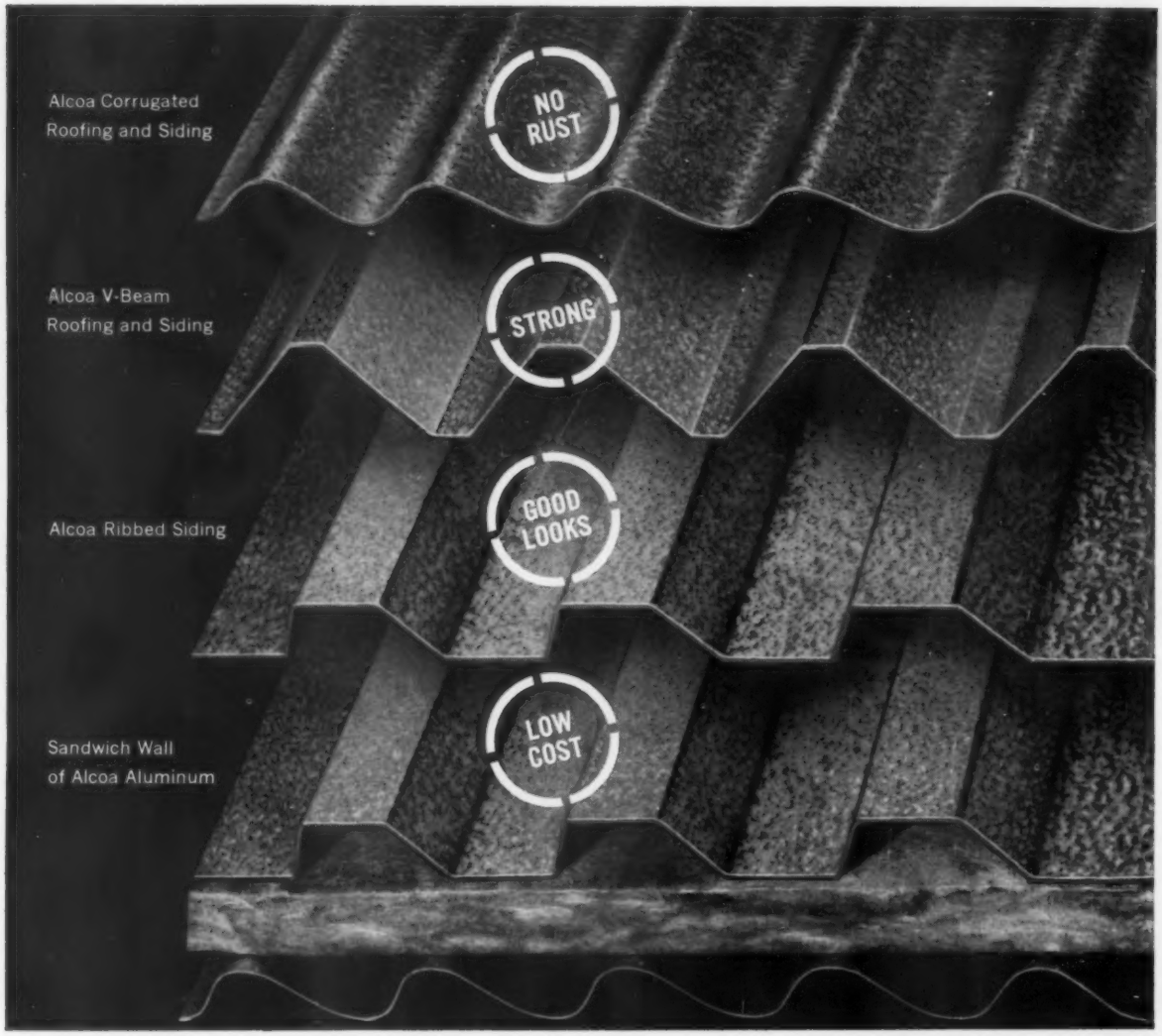
By the proper application of molded case breakers, Square D engineers achieved a substantial reduction in both the size and the cost of the substation—and with no sacrifice in performance.

For the complete story of Square D coordinated design, write Square D Company, 6060 Rivard Street, Department SA, Detroit 11, Michigan.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

For more facts circle 585 on Reply Card



FOUR REASONS WHY

PLANT CONSTRUCTION IS GOING ALUMINUM

Save construction money now and maintenance costs later with these Alcoa® Aluminum Industrial Building Products and Materials . . . for both new plants and plant expansion:

1. Humid atmospheres and industrial fumes mean nothing to Alcoa Corrugated Roofing and Siding. Once up, that's it! No painting or expensive maintenance of any kind ever needed.

2. Aluminum-clad buildings can be *strong buildings* with Alcoa V-Beam Roofing and Siding. Safely carries 30 lb/-sq-ft uniform load on a 10-ft purlin spacing.

3. Aluminum-clad buildings can be *good-looking buildings* with Alcoa Ribbed Siding. This configuration makes buildings clean-lined with good vertical shadows.

4. Sandwich wall of Alcoa Aluminum is the lowest cost insulated metal wall system known: With a "U" value of .155, it has three times the insulating value of 8-in. brick. Goes up fast, too. Permits economical air conditioning.

All of these materials offer the benefits inherent in aluminum—corrosion resistance, low cost and good looks. They are sold and erected by Alcoa Approved Applicators. For the name of the Applicator near you, contact your Alcoa sales office, or write: Aluminum Company of America, 858-C Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM
INDUSTRIAL BUILDING PRODUCTS
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

For more facts circle 586 on Reply Card

positive action against air pollution

Positive action, resulting from an aggressive, industry-wide air pollution policy is rapidly replacing the outmoded philosophy—"wait until someone complains . . . or sues." Today good community relations can be as vital and profitable as increased production efficiency.

Dracco Dust Control Equipment—performance-proved in countless applications—is one of industry's most effective allies in this fight against air pollution. Dracco filtration methods assure 99½-100% air cleaning by trapping dust at its source to prevent both internal and external atmosphere contamination.

The National Supply Company solved an air pollution problem and met the stringent requirements of smog-conscious Los Angeles County. The company installed a special Dracco Dust Control system to prevent escape of waste oxides from its electric furnaces.

If your dust problem involves air pollution, recovery of valuable dust or elimination of nuisance dust, Dracco can help you take the positive action needed to solve it. For information call or write Dracco today.

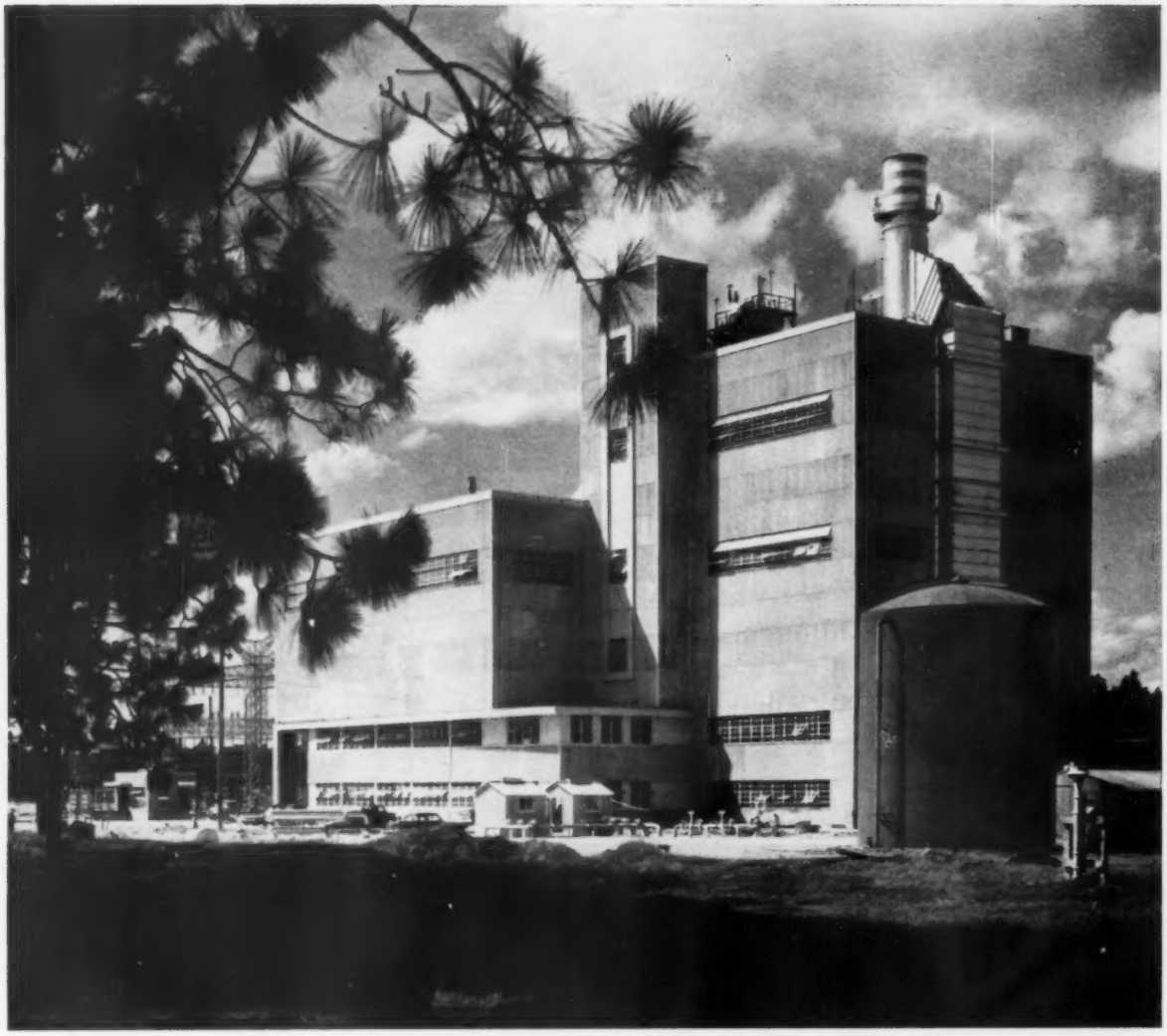
DRACCO DIVISION OF FULLER CO.
4035 East 116th Street • Cleveland 5, Ohio

This Dracco filter unit handles 75,000 cfm of dust-laden air from electric furnaces at National Supply's plant in Torrance, California. Special features of the unit include central classifier-hopper, Dynel filter bags, and automatic discharge of collected dust.

Complete 40-page catalog on Dracco Dust Control Equipment contains detailed data and valuable reference material. Write for Bulletin 800.

DRACCO *airstream* conveyors
dust control equipment

For more facts circle 587 on Reply Card



Gold Bond Corrugated ASBESTONE "400" solves salt air problem of Mississippi Power Company

This new $14,000,000 generating plant of the Mississippi Power Company, located in the growing Biloxi-Gulfport area, supplies 100,000 horsepower through an inter-connected system to southeast Mississippi. Built with an eye to the future, the exterior walls of the plant were sided with 53,000 square feet of Gold Bond Corrugated ASBESTONE "400". And with an eye to greater architectural beauty, Gold Bond PERMABOARD Flat Sheets were used for exterior trim. These walls shrug off the corrosive effects of salt air and assure lowest possible maintenance costs in the future.

A second unit using both Gold Bond® Corrugated ASBESTONE "400" and PERMABOARD Flat Sheets is now under construction on the same site.

If the walls and roofs you design must resist sea air, chemical fumes, rot or fire, consider ASBESTONE "400" and PERMABOARD. Their first cost is low, they go up fast, and offer freedom of design plus the permanence of stone.

For new bulletins describing both these products—and suggesting how they can go to work in the buildings you design—write Dept. PE-38, National Gypsum Company, Buffalo 2, New York.

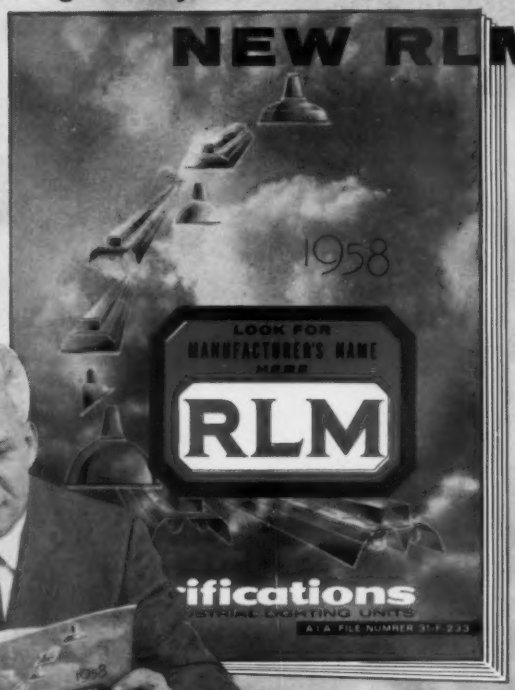
Gold Bond
BUILDING PRODUCTS

NATIONAL GYPSUM COMPANY

For more facts circle 588 on Reply Card

up, UP again!

. . . goes every INDUSTRIAL LIGHTING UNIT SPECIFICATION in the NEW RLM BOOK



NEW *specifications for Special Service fluorescent units!*

NEW *specifications for units utilizing 800 ma. fluorescent lamps!*

NEW *incandescent reflector sizes!*

NEW *lighting curves and data for every RLM Specification!*

NEW SPECIAL SERVICE UNITS feature one-piece, all-porcelain enamel, housing to withstand m... dusty atmosph... more light.

NEW 80... UNITS Now ... specify ... for 800 ma. ... scent lamps ... produce 40% ...

NEW INCANDESCENT SPECS for industrial units include an increase in number of available sizes; additional applications.

NEW MOUNTING SPECS for fluorescent, cover individual and continuous row tandem mountings; simplify installation.

RLM SPECIFICATION BOOK FREE! Send for your copy of this new, upward-revised edition! Page by page, "spec" by "spec," it's your most valuable reference book on industrial lighting!

Please send me a copy of the new upward-revised RLM Specifications Book—I understand there is no cost or obligation on my part.

Name..... Title.....

Firm.....

Address.....

City..... Zone..... State.....

YOUR BASIC ASSURANCE OF HIGH QUALITY

This label identifies the RLM-certified lighting equipment of 26 leading manufacturers

RLM Standards Institute, Suite 831, 326 W. Madison St., Chicago, Ill.

R-234

For more facts circle 589 on Reply Card

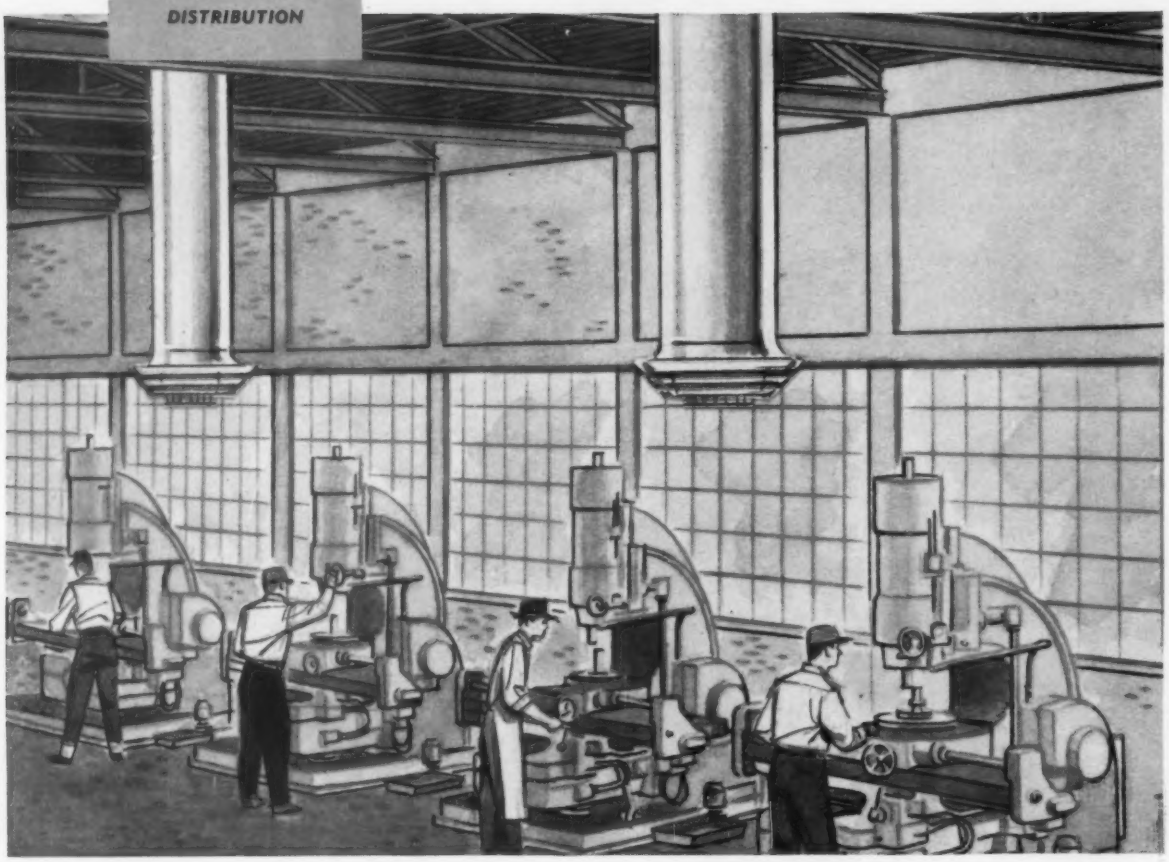
THE MARK OF QUALITY

BARBER COLMAN

Uni-Flo

ENGINEERED AIR DISTRIBUTION

DELIVER FRESH AIR AT WORKING LEVEL WITH VENTURI-FLO INDUSTRIAL DIFFUSERS



Properly distributed make-up air is essential for the health and comfort of manufacturing plant occupants. Failure to provide this comfort factor can result in reduced production and personnel problems.

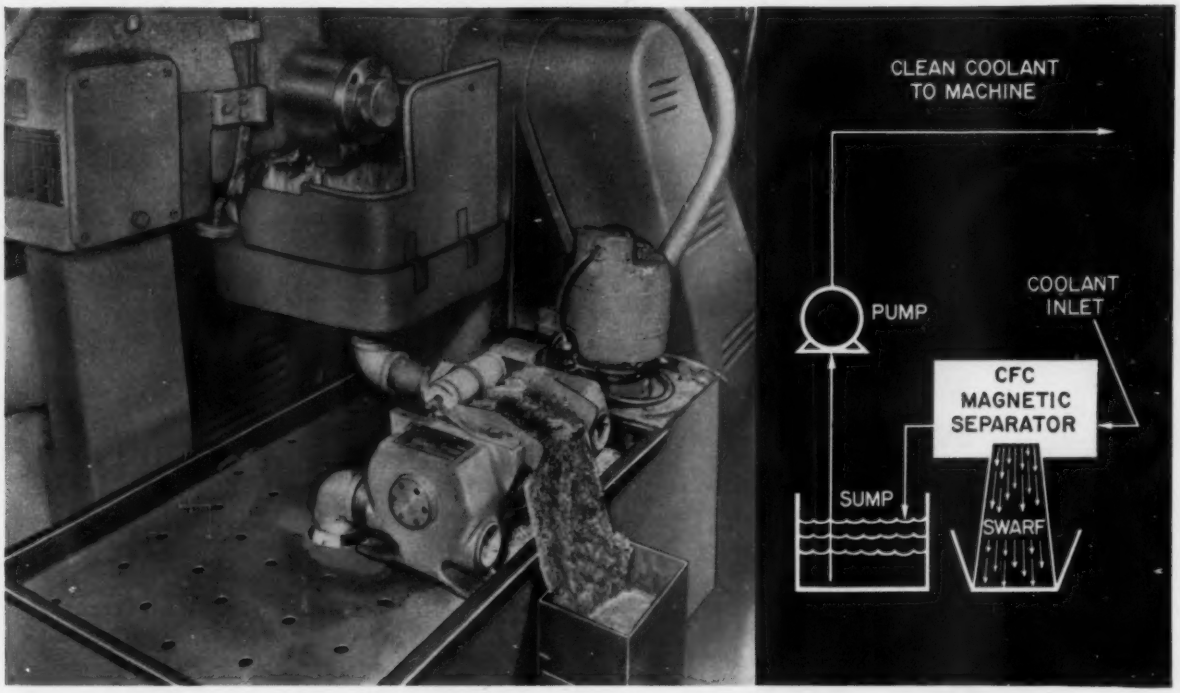
The new Model BP Venturi-Flo Industrial Diffuser permits air to be piped down to occupancy level — entrainment of stagnant, smoky air in truss space is eliminated. Full range air pattern adjustment permits air to be delivered above the heads of occupants or, to eliminate need for man-cooling fans, directly on occupants. Adjustment is simple *and from the floor* — no need to disassemble the unit. For complete details contact your nearby Barber-Colman Field Office, or write for Catalog F-7722-1.

Only Barber-Colman combines skills in both Air Distribution and Automatic Controls for undivided responsibility.

BARBER-COLMAN COMPANY

Dept. C, 1639 Rock Street, Rockford, Illinois

For more facts circle 590 on Reply Card



CHIPS ARE NO CHALLENGE...

New low-cost CFC Magnetic Separator keeps coolants free of ferrous contaminants

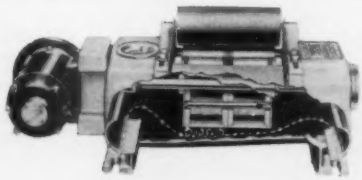
About the size of a typewriter — and not much more expensive — the new CFC Magnetic Separator continuously removes ferrous chips and sludge from machine tool coolants. Powerful Alnico permanent magnets revolve constantly and automatically. There's no downtime or maintenance labor. Laborious sump cleaning is reduced to a minimum. You're assured of longer tool and wheel life, better product finish, substantial coolant saving.

Compact and lightweight, the CFC Magnetic Separator is easy to install. It takes less than 2 square feet of floor space — can often be installed between machine tool columns. Unit includes totally enclosed gearhead motor. No separate pump is required. Choice of inlets and outlets make it easily adaptable to any machine tool — grinders, gear cutters, thread rollers, honing, broaching, milling, drilling machines, etc. Non-ferrous housing prevents rusting.

To provide prompt delivery, the CFC Magnetic Separator is stocked in many local areas.

LOOK AT THE PRICES!
As low as $325

Dimensions	No. 1	No. 2	No. 4
Length	21 5/16"	21 5/16"	22 3/4"
Height	7 7/8"	9 1/2"	11 7/8"
Width	11 3/4"	12 1/4"	15"
Capacity			
Mineral oil, max. operating viscosity 170 SUS	5 GPM	10 GPM	20 GPM
Water-Based Coolants	10 GPM	20 GPM	40 GPM
Price	$325	$410	$535



All units are sold on a money-back performance guarantee. Write for detailed drawings and technical literature to Dept. PG.

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

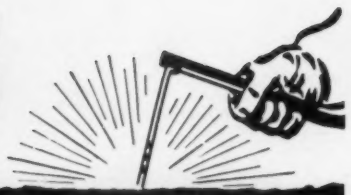
MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

For more facts circle 591 on Reply Card

Weldynamics



ARC WELDING AT WORK CUTTING COSTS

Mobile maintenance shop has ready-to-use power

Lincoln 200 amp. *"Shield-Arc" Engine-Driven welder. Furnishes 115 volt DC auxiliary power for lights, tools, etc. Write for Bulletin SB-1337.*

There's no lost motion — no waiting for electricians, for special wiring or hook-ups when your maintenance man takes the power he needs to the job.

Weldynamics recommends ready-to-use power in the form of a Lincoln Engine-Driven welder mounted on a gasoline powered truck. This combination saves as much as 125 man hours per month for one manufacturer. Auxiliary power, standard on all Lincoln Engine-Driven welders, operates tools and lights, and 200 amp. welding current handles welding jobs with ease.

Mobile maintenance shops with Lincoln Engine-Driven welders are saving money for others. Why don't you put Weldynamics to work in your shop.

The World's Largest Manufacturer of Arc Welding Equipment

© 1958 The Lincoln Electric Company

THE LINCOLN ELECTRIC COMPANY, DEPT. 4001, CLEVELAND 17, OHIO

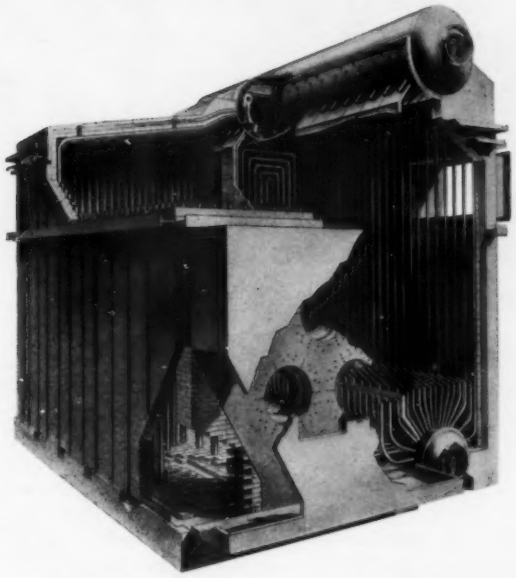
For more facts circle 592 on Reply Card

Here's why you get

IMPORTANT SAVINGS in

- ✔ *first cost*
- ✔ *installation*
- ✔ *operation*
- ✔ *maintenance*

with the FW Series "SC" STANDARD BOILER

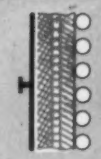


THESE nine Foster Wheeler design features add up to substantial savings in the cost of steam generation. Equally important is the extra *dependability* that's built into every "SC" unit – the result of over 60 years of experience in the design and construction of large, high-pressure steam generators for leading central station power plants.

Pre-engineered in all details and standardized for economy, these FW standard steam generators are available for oil or gas firing, in capacities from 50,000 to 150,000 lb/hr, for pressures to 1500 psi and superheated steam temperatures to 950 F. For complete information, send for Bulletin B-55-4. *Foster Wheeler Corporation, 666 Fifth Ave., New York 19, N.Y.*

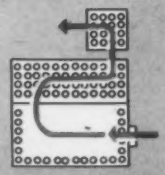
1. COMPLETELY WATER-COOLED WALLS

All furnace walls are cooled by closely-spaced tubes, minimizing setting maintenance and preventing excessive exit gas temperatures.



2. EFFICIENT FIRING ARRANGEMENT

Burner arrangement assures maximum rating without overheating furnace tubes. Rear wall is over 19 ft. from burner wall, permitting long, horizontal flame travel.



3. FULLY DRAINABLE SUPERHEATER

A completely drainable superheater permits removal of all condensed water from the elements before start-up.

4. HIGH STEAM PURITY

The normal drum internals consist of chevron dryers and a dry box. Separators may be added which make possible a steam purity of 1PPM or less.

5. UNRESTRICTED CIRCULATION

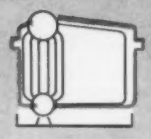
Absence of headers provides free circulation through integral risers and downcomers, eliminating header handhole plates and gaskets.

6. BOTTOM SUPPORTED UNIT

The bottom-supported design fully utilizes the structural strength of the tubes and provides low unit stresses in all members.

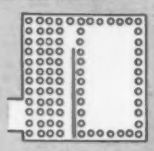
7. PRESSURE-TIGHT CASING

The all-welded casing forms a rigid, pressure-tight unit that can be arranged for pressurized or balanced draft operation.



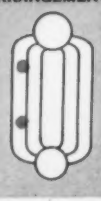
8. MINIMUM REFRACTORY BAFFLING

The wall separating furnace and boiler bank is the only refractory baffling used. It is completely accessible from the furnace.



9. SIMPLE SOOT BLOWER ARRANGEMENT

Soot blowers are supported on the outer row of boiler-bank tubes, simplifying alignment and providing easy access.



FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

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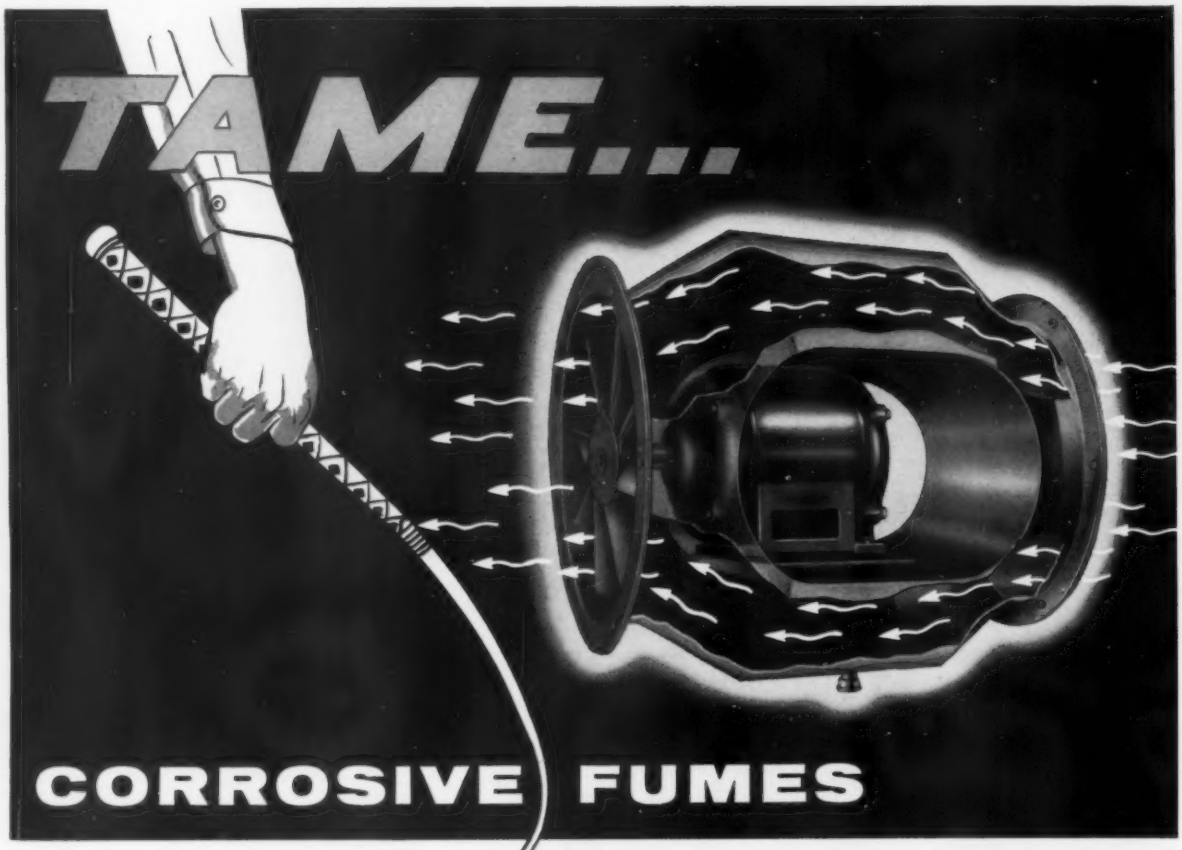


with BIFURCATOR® FANS

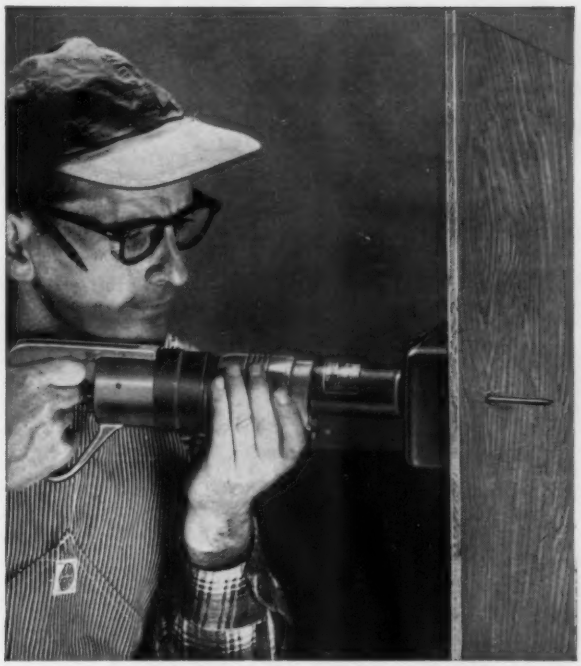
This divided housing fan is a product of over 30 years' experience in design and development. It is specially engineered and built for efficient removal of corrosive, hazardous and high temperature fumes from industrial plants and areas including:

CERAMIC PLANT INSTALLATIONS ★ CORE BAKING OVENS ★ ELECTRO-PLATING TANKS ★ FOOD PROCESSING OVENS ★ GLASS PLANTS ★ METALLURGICAL PLANTS ★ PAPER MILLS ★ POURING AND SHAKE OUT AREAS ★ TEXTILE MILLS

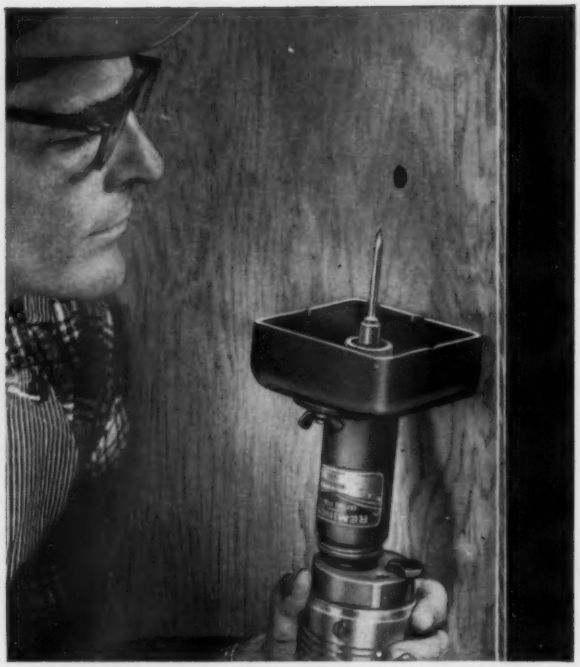
FOR FURTHER INFORMATION
SEE OUR SECTION IN
SWEET'S
PLANT ENGINEERING OR
INDUSTRIAL CONSTRUCTION
CATALOGS
OR WRITE FOR COPY
PE-358

De Bothezat FANS
A DIVISION OF
American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

For more facts circle 594 on Reply Card



If operator inadvertently fires new Remington Captive Stud Tool into inadequate base material—



Captive Stud Guard Assembly prevents free flight of stud which is locked to tool during firing.

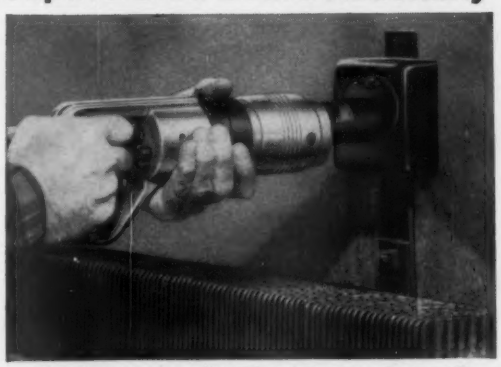
Safest Stud Driver Ever Designed!

Remington Stud Driver...with Model 440 Captive Stud Guard Assembly

Power, efficiency, speed *and safety* are features of the new Remington Stud Driver with Captive Stud Guard Assembly. It's designed to prevent free flight of studs through a working surface... permitting use of the tool in a whole new range of fastening situations.

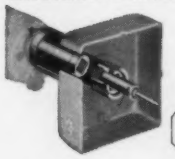
Just squeeze the trigger to anchor wood or metal sections to concrete or steel with ¼" diameter Remington Studs. Scientifically graded 22 caliber Power Loads furnish *exact* driving force you need to do the work. No pre-drilling, no outside connections required!

What's more, you can choose from a *complete* selection of ¼" diameter Remington "Power-Guide" Studs. And for particular applications involving repetitive use, you may prefer one of 15 special-purpose guards to adapt the versatile Stud Driver to *your* job requirement!



ANCHOR fin-pipe radiator brackets to concrete walls in *seconds* with this *new* Remington Stud Driver! You can take the tool anywhere, use it anywhere for all your light, medium and heavy-duty fastening jobs.

Exclusive Remington Captive Stud Guard Assembly has new "*Safety-Zone*"



Heart of the Captive Stud Assembly is combination of square-headed piston and aluminum alloy buffer. Piston is abruptly halted by buffer when base material is inadequate to stop the stud. Remember: If it's the Remington Captive Stud tool, it's the safest Stud Driver on the market!

Remington DUPONT

STUD DRIVER

Mail coupon for free booklets

Industrial Sales Division,
Dept. PE3
Remington Arms Company, Inc.
Bridgeport 2, Connecticut

Please send information about the new Remington Stud Driver and Model 440 Captive Stud Guard Assembly.

Name.....

Firm.....*Position*.....

Address.....

City.....*State*.....

Remington Arms Company, Inc., Bridgeport 2, Connecticut

For more facts circle 595 on Reply Card

Exclusive SPLIT SECOND TIMING Pays-Off in COMPLETE PROTECTION

ECON-ALLOY makes the difference!

Exclusive Econ-Alloy thermal element gives this fuse a unique sense of "timing." When current overload is continued beyond the safe, pre-determined time, Econ-Alloy breaks the circuit by changing directly from solid to liquid. The usual plastic stage is eliminated, insuring faster, more accurate protection against overloads.

- cut fuse costs
- end needless fuse blows caused by temporary or harmless overloads
- eliminate unscheduled down time due to needless fuse failure
- * instantaneous short circuit protection

ECON®
DUAL-ELEMENT cartridge fuses

This fuse **knows** exactly when to blow. The exclusive Econ-Alloy Thermo Element provides you with "timed" protection against overloads (up to 500%). This fuse also provides instantaneous breaking action on shorts.

Dual-Element Fuses have been specifically designed and engineered for use in motor, branch and feeder circuits. They are time and money savers where you have frequent surges of power or temporary overloads such as occur in high starting torque motor circuits. They often allow you to by-pass the installation of expensive circuit breaker equipment.

Dual-Element Fuses are available in sizes from 2" up to 13⅝"; 0 to 600 amps; for 250 and 600 volts—and in both knife blade and ferrule types. Listed by Underwriters' Laboratories.

Write for ECON Dual-Element Catalog S-60
. . . or literature on all Economy Fuses.

SINCE 1911

ECONOMY FUSES
FOR EVERY PURPOSE

1563

ask your
ELECTRICAL WHOLESALER
for Economy Fuses

ECONOMY FUSE & MFG. CO., 2717 Greenview Avenue, Chicago 14, Illinois

For more facts circle 596 on Reply Card

For more facts circle 597 on Reply Card →

An improved
Combination Starter
for extra safety

While the changes in the new Allen-Bradley Bulletin 712 and Bulletin 713 starters may be relatively minor, they were made in your interest—to give you the best control on the market.

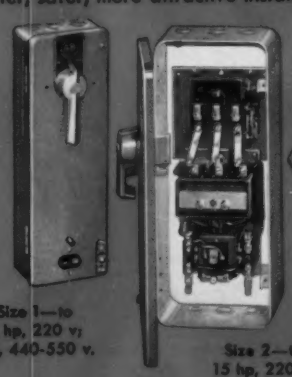
The new operating lever has been attractively restyled and structurally improved. Now the disconnect switch can be locked "open" or locked "closed"—with three padlocks of any kind. For the maintenance engineer, a concealed latch pin is built into the lever, which permits opening the door of the cabinet without opening the disconnect switch and stopping the motor. The door can also be padlocked shut independently of the operating lever.

With the disconnect lever in the "off" position, the cabinet door can be opened. At a glance, it can be seen that the movable contacts are open. An added "safety" feature—the incoming line connections are covered with an insulating plate to prevent accidental contact.

ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

BULLETIN 712—These modern A-B combination starters cost no more than a separate starter and disconnect switch, and make a neater, safer, more attractive installation.



Size 1—to 7½ hp, 220 v; 10 hp, 440-550 v.

Size 2—to 15 hp, 220 v; 25 hp, 440-550 v.

Size 3—to 30 hp, 220 v; 50 hp, 440-550 v.

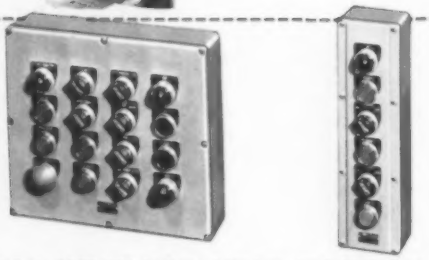
Size 4—to 50 hp, 220 v; 100 hp, 440-550 v.

3-58-MR

Not only the Motor Starters, but the Accessories must be "Quality," too!

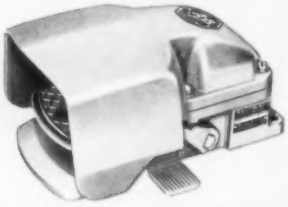
we specify ALLEN-BRADLEY ...all the way

"Trouble" that shows up in a motor starter is often traced to a faulty operating auxiliary—such as a limit switch or even a push button station. Allen-Bradley builds the same high quality into its many accessories as it does into its motor starters—to give you millions of trouble free operations. They are also tested as thoroughly. Contacts are usually double break and always are of a silver alloy, which means they remain in perfect operating condition. It will pay you, too, to specify Allen-Bradley *Quality* control—"all the way!"

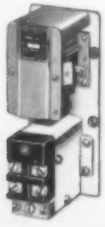


Bulletin 800T Oiltight Control Stations. Available in from one to sixteen units, in die cast aluminum enclosures.

Bulletin 802 Precision Limit Switch, with oiltight head and body.

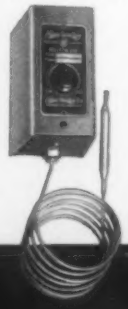


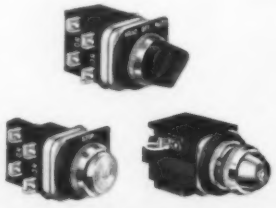
Bulletin 805 Foot Switch. In rugged die cast enclosure for the toughest service.



Bulletin 849 Pneumatic Timer. Reliable and accurate.

Bulletin 837 Temperature Control with snap action, precision switch.





Bulletin 800T Oiltight Push Button, Selector Switch, and Press-to-Test Pilot Light.

Bulletin 800 Standard Duty Push Button. One, two, and three buttons; also as selector switch.

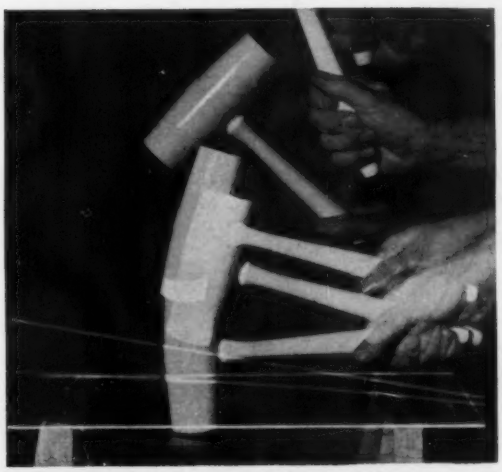
Bulletin 836 Pressure Control in NEMA 4 watertight enclosure.

3-58-MR

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

Plexiglas *glazing could have prevented this*



Breakage resistance is shown here by photo taken at moment of impact of mallet with PLEXIGLAS. Note how PLEXIGLAS "gives" with the blow.

The chances are mighty good that PLEXIGLAS® acrylic plastic would have withstood this impact by a flying fragment.

As a glazing material, PLEXIGLAS withstands shock and vibration . . . takes twisting without breaking. It provides clear visibility and, in tinted form, can reduce sky glare. Adds safety. Cuts replacement costs. Installs easily.

Ask us for full information on the properties of PLEXIGLAS, clear and tinted samples, and the names of local dealers.

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: *Crystal Glass & Plastics Ltd., 130 Queen's Quay East, Toronto, Ontario, Canada.*

For more facts circle 598 on Reply Card

Why the LINK-BELT Series 100 is

TODAY'S MOST WIDELY ACCEPTED BELT IDLER

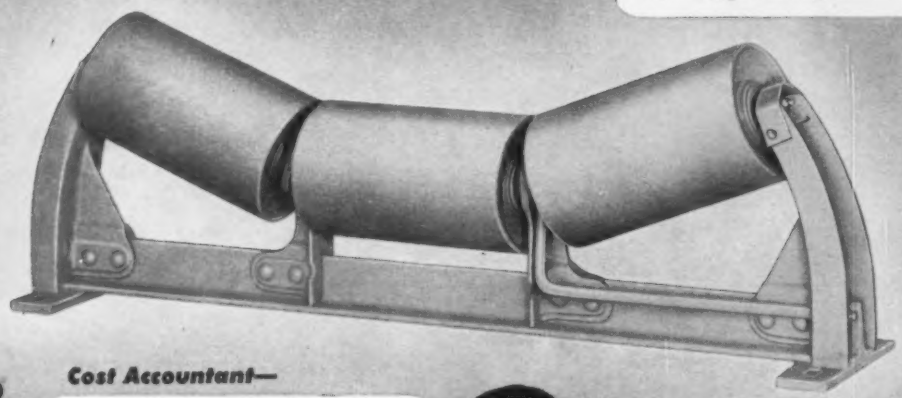
Here's what men who know idlers have to say

Superintendent—

"Service records of the Link-Belt Series 100 belt conveyor idler show that there's no more durable belt conveyor idler in the capacity range. It's a 'work horse'—gives economical service under hard duty, conveying all but the heaviest and coarsest materials."

Engineer—

"Look at these design features. Self-contained, concentric rolls with bearings fully enclosed and protected... strong heavy ribbed brackets and sturdy rigid frames maintain accurate roll alignment—won't spread under load . . . hex nuts that lock rolls in brackets, preventing shaft rotation."



Cost Accountant—

"All costs considered—installation, operation and maintenance. You won't find a better buy in belt conveyor idlers than the Link-Belt Series 100. Its free-rolling action requires less power . . . reduces wear on operating parts and belt . . . cuts replacements."

Maintenance Man—

"Its cartridge seal is the best I've seen . . . has no springs, clips and other small parts to lose . . . cuts servicing time when required. It's tops for keeping grease in, dirt out under the grimiest conditions. Grease fittings are protected, easy to reach."

Broad range of types meets all material and operating requirements

RUGGED . . . free-rolling . . . dirt- and dust-proof—the Link-Belt Series 100 belt conveyor idler combines these and other features for low-cost, dependable materials handling under severe, continuous service conditions. What's more, you have a wide choice of types for any requirement—whether you handle coal, sand, gravel or iron ore . . . sticky or free-flowing materials.

Sturdy rolls of the Series 100 are accurately machined for concentricity—welded for added strength and to keep out dirt and moisture. Smooth, round surfaces and edges prevent belt damage. As for dependability of its roller bearings—Link-Belt has *never* known a bearing failure due to overloading a Series 100 idler. Equally important, strong malleable iron brackets and sturdy, rigid frames maintain accurate roll alignment.

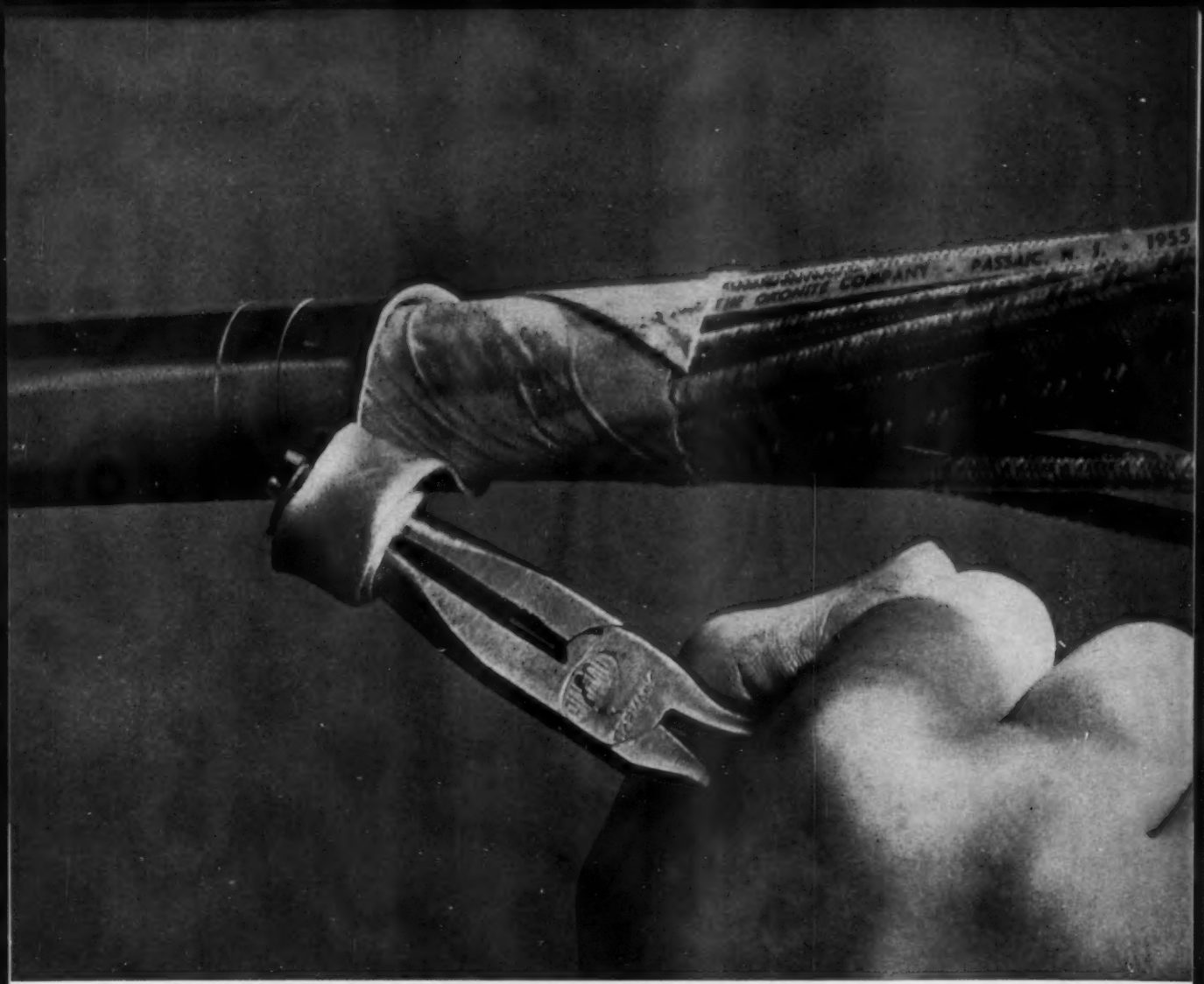
For facts on the Series 100 belt conveyor idler, see your nearby Link-Belt office or authorized stock-carrying distributor. Or write for Book 2416.

LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,493

For more facts circle 599 on Reply Card



ALUMINUM-SHEATHED CABLES

...light ...strong ...smaller diameter ...easy to install and terminate

A seamless aluminum sheath over Okonite cables provides a durable, conduit-type covering of high tensile strength. Yet this aluminum sheath is easily worked with standard conduit tools. It can be bent around obstructions . . . terminated at boxes, transformers, and the like . . . trained in trays . . . or supported by conventional brackets and cable clamps. Standard fittings are available. This low-cost alternate to rigid conduit is available with virtually any Okonite insulation such as rubber, plastic or varnished cambric.

Here are some important benefits of Okonite's aluminum-sheathed cables:

Reduced diameter and lighter weight.

Impervious barrier to liquids and vapors.

Excellent flame resistance.

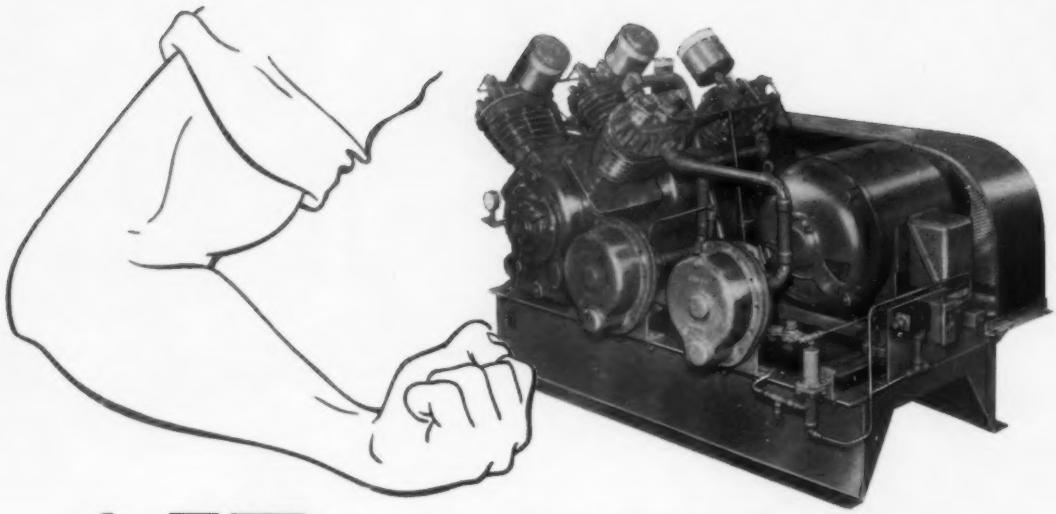
Costs less than regular conduit installations.

Great mechanical strength, yet easily worked.

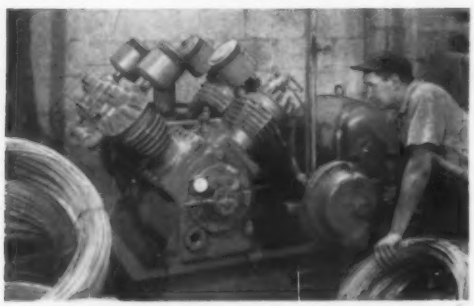
For complete data on Okotherm-insulated (silicone rubber compound) aluminum-sheathed cable for use in high ambients up to 200C (392F), contact your Okonite representative or write for Bulletin PE 1088A, The Okonite Company, Passaic, N. J. 4742

where there's electrical power . . . there's **OKONITE CABLE**

For more facts circle 600 on Reply Card



AIR: ANOTHER ARM for INDUSTRY



Typical installation at Conver Steel and Wire Company, New York. Used to operate spot welders, benders, paint mixers and for clamping, holding, riveting, etc.

BRUNNER
SINCE 1906

AIR COMPRESSORS

To be of consistent value in industry, compressed air must be generated economically by equipment which assures low installation expense and keeps maintenance costs to a minimum.

The BRUNNER compressor meets every test . . . and, in addition, offers these advantages:

It's furnished in either single stage or two stage—to suit your needs.
It's compact! A complete, packaged unit with water-cooled intercoolers and aftercoolers mounted.
It's a space saver requiring minimum room.
It's versatile! Capacity is economically controlled to meet every variety of air demand.
It's rugged! Continuous oil filtering means less wear, longer life.

Single and two stage base mounted electric motor driven units, complete with controls of your choice. Single stage units offered in 80 or 100 P.S.I. ratings of 25-30-40 and 50 H.P. sizes. Two Stage units offered in 125 or 150 P.S.I. ratings of 25-30-40 and 50 H.P. sizes.

For complete details request Catalog 37.

Heat-X Air Compressor Aftercooler with inner-fin construction provides maximum heat transfer with minimum air pressure drop.
Available in WIA (water-cooled) or RIA (refrigerated) models for compressed air systems from 10 to 1500 CFM.

Request Catalog 8065.

BRUNNER DIVISION
DUNHAM-BUSH, INC.
UTICA, NEW YORK

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AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER
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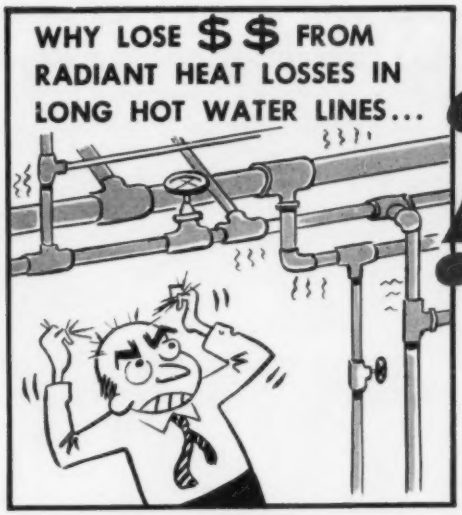
For more facts circle 601 on Reply Card



A.O.Smith

Burkay

INDUSTRIAL GAS-FIRED

WATER HEATERS

can be "spotted" wherever hot water is needed

Save on BTU's . . . Save on Dollars . . . Save on Maintenance with Burkay Gas-Fired Automatic Water Heaters

Large cost reductions can be made in hot water generation by using *Burkay* units. Located strategically, *Burkay* water heater systems provide all the right temperature hot water required for general use and processing needs.

With *Burkay* heaters you cut back the operation of expensive boilers, and in some cases dispense with them entirely . . . thereby reducing overhead, labor, maintenance costs and long hot water lines.

As single units or in "banks" as required, *Burkay* water heaters meet all hot water demands economically.

Highly efficient heat exchanger, rust-free water, minimum of maintenance makes the *Burkay* a popular unit among plant managers. Call on your nearest A. O. Smith-*Burkay* distributor, or your local gas utility to help you.

Burkay industrial water heaters have all-copper waterways. Are rust-free, corrosion-free, leakproof. Are tested at 550 psi. Dependable. Sturdy construction. Compact. Economical operation. Operate on all gases. A.G.A. and A.S.M.E. approved. Completely automatic with suitable thermostats. Guaranteed by A. O. Smith, world's largest water heater manufacturer.

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International Division · Milwaukee 1, Wis.

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makers of famous **Permaglas®** *glass-lined water heaters...* **Permaglas®** *heating and cooling*

For more facts circle 602 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 251-252.

1—RUGGED LAMP for vibration-ridden areas

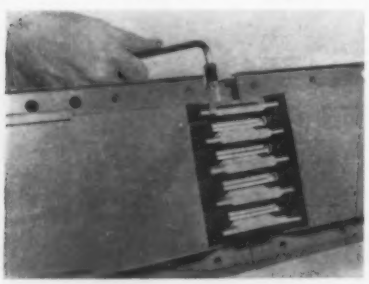
Developed for general industrial lighting as well as for drop forging plants and other places where vibration, shock and exposure to the elements cause premature lamp failure, this new lamp incorporates a vibration-proof mount for the filament. Heavy lead-in wires are connected and reinforced near the filament by a bridge. Supports for filament are also attached to this bridge, providing a compact unit structure which prevents filament damage caused by vibration and accidental shock. Bulletin 27 gives details. Radiant Lamp Corp.

2—SOLUTION guards against lime scale, corrosion

Instantreat is described as a rapidly soluble complex phosphate affording low cost protection against lime scale, corrosion and rusty iron water. It has been developed specially for use with solution feeding equipment in industrial and other water systems. When used with company's chemical feed pump, this phosphate provides a sterile feed solution safe for use in drinking water systems, it is stated, and it takes only 2 min to prepare a high purity feed solution with Instantreat. The feed pump is a 4½-lb water-operated unit designed to offer accurate, automatic and low cost proportioning. Manufacturer claims that this pump, when used with Instantreat, will provide continuous automatic treatment for systems with flow requirements up to 10,000 gph. Calgon Co.

3—BUSWAY SYSTEM designed for aluminum conductors

Rated 225 to 1000 amp, of plug-in design, Type DE Busway is announced as up to 50 per cent lighter and 30 per-cent smaller than other busway of comparable ratings. It is also reported to have features that lower installation costs as much as 50 per cent. Type DE Busway comes in three-pole and three-phase, four-wire designs for maximum 600-v applications. It offers as standard 50,000 amp RMS asymmetrical (40,000 RMS symmetrical) short-circuit capacity. Cost reducing features announced include: a one-bolt joint (shown) that can be tightened with a single key-type wrench to exert up to a ton of force on the overlapping conductors; snap-on hangers; and an adjustable length, which allows a 1-ft adjustment of a run on the job site. It can also be hung on 10-ft centers, instead of the usual 5-ft centers, regardless of position in which busway is hung, manufacturer notes. The aluminum conductors are silver-plated and tubular in design, encased with a heavy butyl insulation. A variety of fittings is available. General Electric Co.



4—FLOOR PATCH MIXTURE permits fast repairs

Emeri-Quikpatch is announced as a quick, wear-resistant emery based, non-resilient floor patching material which permits fast concrete floor repairs without danger of softening, rutting out or poor adhesion. The mixture is also reported to eliminate absorbency, a common deficiency of fast-patching materials. For quick repair of essential concrete floor areas, Emeri-Quikpatch cures and becomes serviceable overnight, company says. A plasticizer gives the product excellent bonding properties, it is noted, and the toughness and hardness of the emery aggregate makes Emeri-Quikpatch long wearing. The material requires no additives except water. Walter Maguire Co., Inc.

5—EPOXY COATING for indoor or outdoor use

Nukemite 66 is an air-dry type epoxy coating claimed resistant to most solvents, acids, alkalis, and abrasive conditions. It is reported to provide excellent interior or exterior protection, and may be applied to wood, steel and concrete by brush or spray. It is available in aluminum and five other colors. Nukem Products Corp.

6—CABLE LADDER made of galvanized steel

This cable ladder comprises a system of interconnecting steel parts and associated fittings readily installed for the support of interlocked armored cable. The basic straight section unit consists

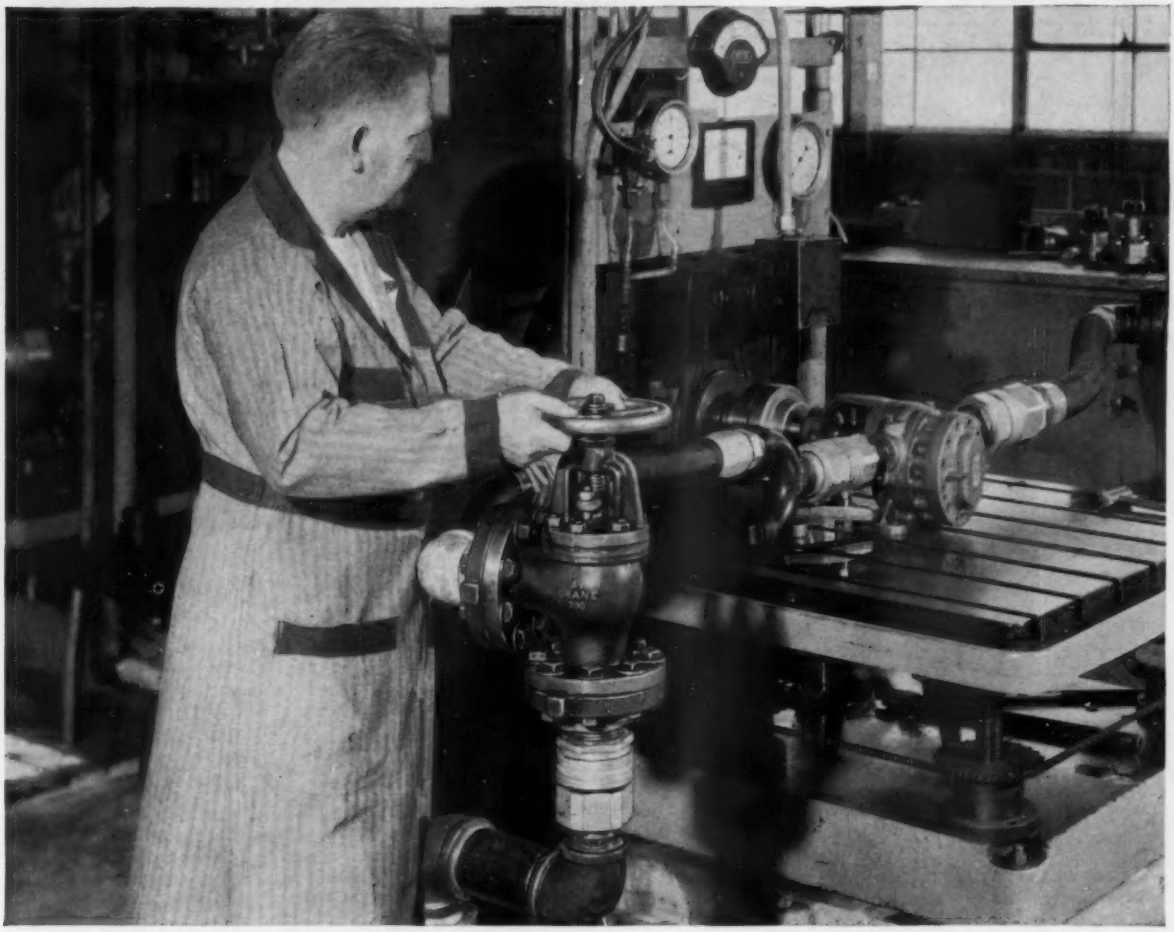
of parallel stringers of Z-section steel with slotted rungs at specified intervals for securing the cables. Spacing of the rungs serves to provide ample support for the semi-rigid cables and facilitates rerouting of individual or branch runs. Dropouts for cables can be improvised between rungs. Ladder straight sections come in 12-ft lengths and a variety of widths. Rungs are spaced from 6 to 18 in. T. J. Cope Div., Rome Cable Corp.

7—DOCKBOARD installs on top of existing docks

Model 1200 Hi-Lo Automatic Dockboard is designed for installation on existing truck docks without costly alterations. You simply bolt it to the top of the dock. A new counterweighting system is mounted on the face of

the dock between two bumpers. No dock attendant is needed, it is pointed out, and no electrical, air, or hydraulic power is required. The backing truck automatically lowers the ramp to working position, manufacturer explains, and after loading operations are completed, the ramp automatically returns to its original position. The adjustable ramp section tilts to compensate for uneven truck beds. When installed under an overhead door, the bottom of the door is notched or equipped with

Roper Hydraulics, Inc. Experiences CRANE Quality



Uses CRANE valve on severe throttling for 23 years—without repairs

Twenty-three years ago, Roper Hydraulics, Inc., Rockford, Ill., installed this Crane 2½-inch, 300-pound bronze plug disc angle valve for throttling service on a 300- to 400-pound pump test line. Since then, testing has been done at pressures up to 1000 pounds without valve failure.

Altogether, this Crane valve has been operated intermittently on an average of 30 hours weekly for 23 years! Only recently was it necessary to replace some of its working parts. Here is demonstrated proof that Crane quality is really the durable kind purchasing agents seek . . . the dependable kind that engineers and plant operating people want.

In valves and fittings for every service, Crane quality gives greater assurance of value—it's today's most reliable price tag. And on all your piping equipment needs, you can get prompt delivery through your local Crane branch or wholesaler.

IDEAS FOR YOU in the 36-page booklet "Valve Performance Facts." Ask your Crane Man for a copy, or write to the address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.—Branches and Wholesalers Serving All Areas

For more facts circle 603 on Reply Card

NEW PRODUCTS

(Begins on page 190)

closure strips. Standard models are 6 ft wide, 8 or 10 ft long, with 12,000-lb roll-over capacity. Kelley Co., Inc.

8—WIRE STRIPPER can handle larger sizes, too

No. 299 Wire Stripper is only 5 in. long, has a thumb-operated gage and is reported to strip all commonly used insulated wire from 14 to 24 gage

without nicking or cutting. Even larger sizes of wire are handled easily, says manufacturer. An advantage cited for the tool is that settings can be made quickly. The method is simply to turn the star gage to the desired notch opening size, notch and strip. Plastic grips provided. Proto Tool Co.

9—SOLVENT CLEANER removes wax coatings

SolGer is a solvent type cleaner especially adaptable for the removal of wax coatings. According to company, it has effectively cleaned off as many as 20 coats of hard, black, oxidized wax with a complete lack of effort. SolGer is claimed non-toxic, non-flammable, non-explosive, and safe for the hands. It can be diluted as much as 18 or 20 to 1, and still maintain effectiveness for the removal of grease, oil, wax, dirt, gummy inks, dye stains, and other grime, says manufacturer. The Gerstel Agency, Inc.

10—CONDULETS for use indoors or outdoors

The EWC series of control station and pilot light condulets of thread joint construction are announced as explosion- and dust-ignition proof, weather resistant and rain tight. They have an aluminum cover with feraloy housing. Joints of the cover opening, operating shaft and pilot light jewel are sealed with Neoprene O-rings. This series is available in one-, two-, or three gangs, pushbutton stations, pilot lights and selector switches, and is designed for Class I, Groups C and D and Class II, Groups E, F, and G. Crouse-Hinds Co.

11—PIPE INSULATION has hinge action opening

Made of fine glass fibers, this pipe insulation has full-length "hinge action" and is available with or without factory-applied canvas, vapor barrier, flame retardant, waterproof or general purpose jackets. With a temperature range from below zero to 350F, the insulation can be used for pipelines carrying hot or cold water, brine or low pressure steam. It has high thermal efficiency, company reports, and even permits a lesser wall thickness in certain applications. The insulation comes in one-piece formed sections, 3 ft long, and is available in inner diameters to fit standard iron pipe and copper tubing. It is offered in wall thicknesses necessary for the simplified dimensional plan, widely used for mul-

tiple layer applications. Each section is cut longitudinally through one wall and almost through the other wall to provide the hinge action and closure. The product is described as resilient and tough, and so light in weight that a 1-in. thick section for 2-in. iron pipe weighs only 8/10 lb, or about ¼ lb per lineal foot. No special tools needed for installation. L.O.F. Glass Fibers Co.

12—ADDITIVE, for hydraulic systems, is bactericidal

Hydrolubric, a concentrated (1 to 1000) lubricant and rust preventive for water-actuated hydraulic systems is now supplied in bactericidal form. The bactericidal agent drastically retards growth of odor-producing organisms, reports manufacturer; it also minimizes slime which can clog filters and screens. It is pointed out that while not a cure-all for cleaning dirty and bacteria laden systems, the bactericide will keep a reasonably clean system free of odor and slime while the Hydrolubric does its primary work of lubricating. E. F. Houghton & Co.

13—TEFLON HOSE with reusable fittings

Springfield 140 is Teflon hose assembly with fittings that are detachable and reusable. The Teflon inner core is reinforced with a stainless steel wire braid to enable withstanding of extremely high pressure. The hose is reported chemical and corrosion-resistant from -100 to 500 F. No special tools or skills are required to remove

and apply the reusable fittings, it is pointed out. Assemblies can be made in advance or in the field, and damaged lines repaired quickly. Each fitting consists of three pieces: a compression nut, tapered ring and nipple insert. The nipple insert—only part of the fitting assembly in contact with the fluid—is made of stainless steel. The rings are cadmium-plated to assure non-galling sealing surfaces. Sizes range from ¼ to ¾ in. and include JIC and SAE fittings. Titeflex, Inc.

14—DIAPHRAGM VALVE of highly resistant plastic

This plastic diaphragm valve is designed to operate at 300 F with a chemical resistance approaching that of glass. It was developed to meet requirements for a plastic valve that features high temperature resistance (up to 300 F at 50 psi), excellent chemical resistance and exceptional dimensional stability, through all operating temperature ranges, and is compatible with both plastic or metallic piping. According to company, this diaphragm valve meets these requirements, and is available in handwheel operated, lever operated, sliding stem and air operated types. Sizes range from ½ in. through 2 in. Hills-McCanna Co.

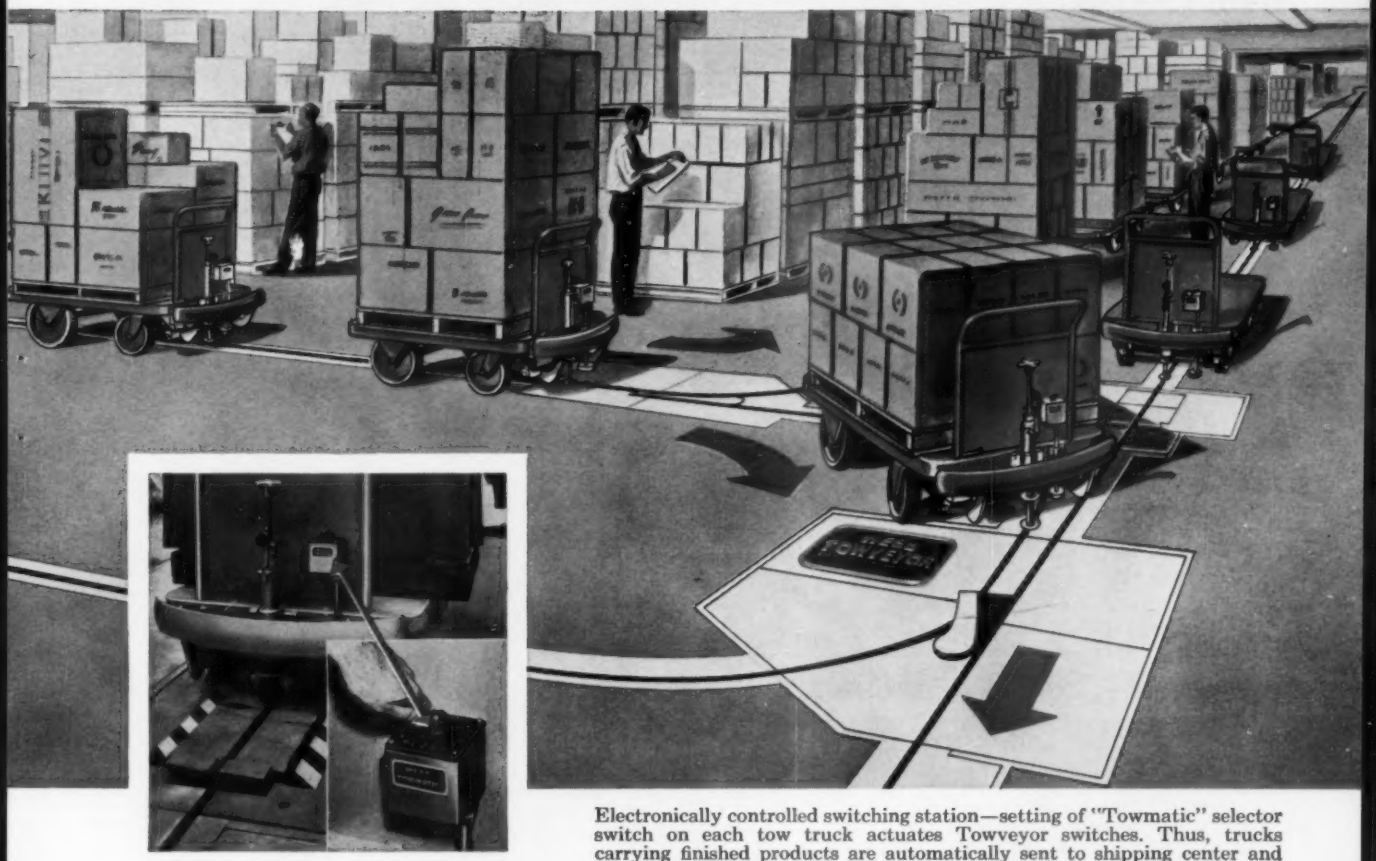
15—MODULE FIXTURE with open-top construction

This Spacelighter consists of a rigid frame forming the periphery of the fixture, leaving the entire top open. The diffusers rest on a flange around the inside bottom edge of the fixture. Advantages claimed for this construction include extreme light weight for ease in installation, use as direct-indirect suspended fixture because of open-top construction, reduction in cost, elimination of striations since transformers are in side channels. The Spacelighter is only 3 in. deep, finished in baked white enamel. Vinyl diffusers are available. Leadlight Fixture Co.

16—HUMIDIFIER can be portable or stationary unit

Although designed for greenhouses, the Everlite Automatic Humidifier is suggested for industrial buildings and warehouses where close control of humidity is required. According to manufacturer, it automatically main-

FIRST Electronically Controlled Towveyor . . .



Electronically controlled switching station—setting of "Towmatic" selector switch on each tow truck actuates Towveyor switches. Thus, trucks carrying finished products are automatically sent to shipping center and all other trucks are diverted to Towveyor at right.

Slashes Handling Costs . . . Prevents Traffic Snarls . . . Speeds Production

Johnson & Johnson, in designing their "Plant of Tomorrow", gave major consideration to efficient materials handling. Required was a handling system providing: lower handling costs—smoother traffic flow—increased production—reduced manual handling—integration of materials movement in and between three buildings—automatic delivery of a variety of materials to many locations.

After intensive study of a number of handling methods, J & J selected a Webb electronically controlled Towveyor as their basic materials handling system . . . it filled their requirements.

In fact, all materials handling, in the two manufacturing buildings and shipping, centers around this 3624 foot Towveyor. To provide electronic control for movement of materials, each tow truck is equipped with a 19-station Towmatic selector switch—each station representing a different location in the plant. Thus, by simply flipping Towmatic switch to desired station and lowering tow pin into Towveyor slot, the tow truck is started on its way—electronics take over and materials automatically travel to their destinations.

Two other Towveyors located in shipping center wind through order-picking areas to provide at-hand-convenience for personnel filling customer orders. Towtrucks carrying filled orders are placed on these Towveyors for unescorted travel to loading dock. By automatically performing the multiple materials handling operations required in manufacturing, warehousing and shipping, Towveyors at J & J reduce manual handling—lower operating costs—speed production.

JERVIS B. WEBB COMPANY
SPECIALISTS IN CUSTOM CONVEYOR SYSTEMS
8933 ALPINE AVENUE • DETROIT 4, MICHIGAN

FACTORIES: DETROIT • LOS ANGELES • ATLANTA • HAMILTON, ONT., CANADA • ENGLAND • FRANCE • BELGIUM • AUSTRALIA

For a detailed description of the Johnson & Johnson Towveyor system and its many benefits, write for 12-page Bulletin 28.

Webb in-floor Towveyor and overhead Tow-Conveyor systems are completely described and illustrated in Catalog 157—write for your free copy.

For more facts circle 604 on Reply Card

NEW PRODUCTS

(Begins on page 190)

tains a constant humidity—all you do is set the dial on the humidistat. It can be used as either a portable or stationary unit. To operate, it is plugged into a 110 v a-c outlet and the water line attached with hose or pipe. Company says it operates quietly, needs no oiling and runs indefinitely without attention. It is designed to provide dripless atomization. The unit consists of an air compressor, solenoid valve, humidistat and air-water nozzle. The nozzle is adjustable for volume and the unit has a capacity of 2½ gph. For larger areas or separate areas additional nozzles may be added and operated simultaneously. Aluminum Greenhouses, Inc.

17—DIELECTRIC TEST SET for higher d-c voltages

Model 2 Dielectric Test Set is designed for measuring direct current at voltages up to 100 kv when applied to the insulation of electrical equipment such as generators, transformers, bushings,

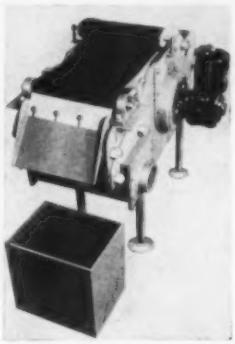
cable. Features reported for the Model 2 include: provisions for utmost safety; simple operation and reliable performance; excellent output voltage regulation; compact design; facilities for voltage and leakage current measurements. Incorporated in the Model 2 is a polarized primary which serves to prevent the set from being raised above ground potential. Also included is a high voltage reset button to prevent the high voltage output being energized without the operator's knowledge. James G. Biddle Co.

18—SOLVENT CLEANER for precision components

Gyroclean Solvent 113 is announced as a purified Trichlorotrifluoroethane. According to manufacturer, it has the best combination of properties of currently available solvents commonly used for cleaning precision components, is the least toxic, evaporates fast, is non-flammable, has low residue, and is compatible with gyroscope sealing and potting resins. BI Techincal Data Sheet 113 gives full details on this solvent. Bacon Industries, Inc.

19—MAGNETIC SEPARATORS deliver cleaner coolant

Two high efficiency magnetic coolant and cutting oil separators are introduced for use in grinding, honing, lapping, thread grinding and other ferrous



metalworking operations. Both metallic and non-metallic solids are removed from coolants through a combination of magnetic and mechanical separation. An adjustable time cycle rotation of a magnetic drum causes a magnetized brush to form, it is explained, and the brush provides a filtering action which removes the non-metallic as well as metallic solids from the dirty coolant. In one model, a scraper blade removes solids from the magnetic drum. The other model incorporates a conveyor system to remove solids on a belt to deliver them to a disposal point. In both designs, swarf passes through a squeeze roller to remove trapped liquid so that a dry swarf is discharged into the disposal receptacle. Infilco Inc.

20—VALVE PACKING reduces maintenance, leakage

Made of Teflon-coated asbestos, 590 Packing is designed to adapt valves for use over a 450 F temperature range without readjustment, and is claimed to reduce valve maintenance and leakage wherever temperature and pressure extremes exist. The packing is reported suitable for temperatures between —50 F and 400 F, and pressures up to 250 psi without adjustment or repacking. Along with the packing, the company announces a packing gland assembly for better guidance of stem, resulting in less packing wear and hysteresis. Both packing and gland assembly are presently used on two-way Flowrite Valves and No. 11 Regulators with ¼ in. and ⅜ in. stems. The Powers Regulator Co.

21—TESTING KIT for machine tool cutting fluids

With this test kit you can spot test various types and mixtures of coolants on the job, without draining and refilling the entire machine system, it is announced. The kit contains a 20-oz graduated beaker and stirring spoon for preparing coolant mixture in proportions desired. Two plastic squeeze bottles with jet-type nozzles permit simulated machine flow of the test fluid directly on the work. Included in the kit are 16-oz bottles of cutting fluid and soluble oil cencentrate, together with a dilution chart for various machining operations based on the type of material to be machined. Necessary test equipment, dilution chart and samples of other cutting fluilds are packaged in a canvas zipper case. The kit costs around $5.00. Phillip M. Stinson, Inc.

22—HEAT FANS for high temperature application

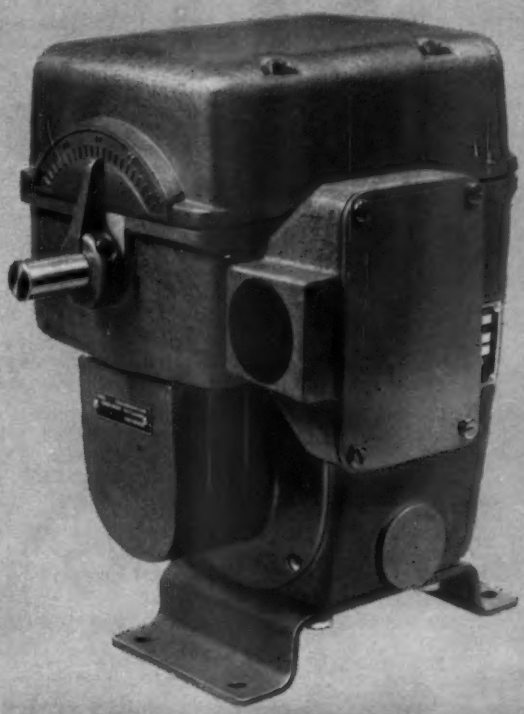
Dura-Temp Heat Fans feature a design which utilizes a new principle for keeping the bearings in cooler operating zones, preventing high temperature inside the fan from reaching bearings and causing bearing trouble. A rotating member of dissimilar alloy, fitted to the shaft, radiates and circulates ambient heat away from the bearing areas. The Dura-Temp Heat Fan line runs from 600 to 30,000 cfm and will handle temperatures ranging up to 1650 F. Bulletin HF-100 gives details. General Blower Co.

23—JET GUN shoots the line right through conduit

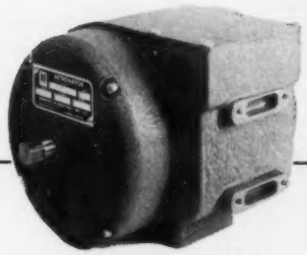
This jet line gun shoots line through conduit in seconds, it is announced, and is simple to operate. A packaged spool of nylon line is attached to a sealed cartridge of liquefied gas which, in turn, is then muzzle-loaded into the

gun. After insertion into conduit, a trigger actuates a firing pin, puncturing a hole in the cartridge which, in turn, releases the jet action of compressed liquefied gas. The cartridge then travels through conduit at high speed laying the line behind it. Effective distances of 400 ft in straight

has the power you need for high accuracy in many electric control applications



New INDUSTRIAL VALVE MOTOR SERIES 831E



The **ACTIONATOR*** gives dependable, low-cost service where the application calls for medium power.

Operate valves, dampers, louvers and other final control elements with this rugged, lightweight industrial motor. It's available with on-off, two-position, floating or proportional control. Its features include:

- **High torque ratings**—to 200 inch-pounds.
- **Fast speeds** available to meet application requirements.
- **Internal brake** to hold load in any position without coasting or hunting.
- **Easy adjustments**—readily accessible, field adjustable, cam-operated travel and auxiliary switches.

For details, write for Specification S-804-3, or call your nearby Honeywell field engineer.

**Tradename Minneapolis-Honeywell Regulator Co.*

Designed primarily for valve or damper applications, Honeywell's powerful new Industrial Valve Motor is suitable for many other control applications where high accuracy and reproducibility are required. It rounds out the complete line of Honeywell pneumatic and electric industrial motors.

Some of its outstanding features:

- Positive control action without coasting.
- Accurate positioning of final control elements over full drive shaft rotation.
- Over-travel protection for the slidewire.
- Arc-suppression circuit to protect auxiliary relays.
- Readily accessible internal components.
- Variety of speeds (3 to 120 seconds) and modes of control available.
- Rated output torque—up to 62.5 ft. lbs.

For complete details on the new Series 831E Industrial Motor, write for Specification S-804-2, or call your nearby Honeywell field engineer. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

H HONEYWELL *First in Controls*

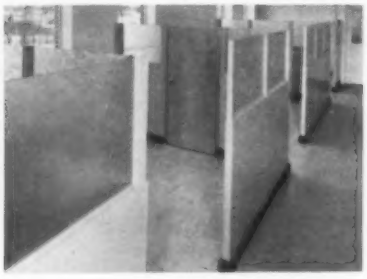
NEW PRODUCTS

(Begins on page 190)

runs are claimed. The gun can also be used for fishing in under floor ducts and raceways as well as in flexible conduits. Graybar Electric Co., Inc.

24—MOVABLE PARTITIONS in panel, flush wall types

Ainswall Partitions come in two types: Type B is a panel partition, and Type F, (shown), a flush wall unit. Both are movable by sections and need not



be disassembled. They are prefabricated and prefinished in a variety of baked enamel colors and reported extremely low in cost. Standard partitions are available in four cornice heights from 7 ft 2 in. to 10 ft 2 in.; other sizes may be had. The panel partitions are available with hardboard, asbestos board or glass paneling. A rubber molding is color matched to the panels. Ainswall Partitions are completely installed, with installation work done under supervision of manufacturer's service staff. Mult-A-Frame Div., Ainsworth-Precision Castings Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 251-252. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

25—WATER COOLERS for use in closed systems

Designed for closed system applications where process water temperatures are critical, these units are claimed to save up to 95 per cent of the water normally used for industrial cooling. The line includes three styles: centrifugal fan draw-through units, suggested for indoor installation where floor space is a factor; centrifugal fan blow-through units, featuring dry fan operation for longer life; and propeller fan blow-through units for use where minimum horsepower is desired. Applications include cooling water for diesel or gas engines, air compressors, plastic molds, and other water jacketed equipment. Baltimore Aircoil Co., Inc.

26—GLOW LAMP shines 20 times as bright

The NE-51H, a high brightness glow lamp, is announced as 20 times as bright as company's previous models and adaptable to many applications where appreciably higher brightness is desirable. When operated in series with recommended resistor, the lamp has a life in excess of 5000 hr. It has the same rugged structure and physical dimensions as company's Model NE-51, it is noted, and will withstand a high degree of shock and vibration. The lamp is intended for use as a pilot lamp on a-c circuits only. For optimum performance on 110-125 v, a resistor of 25,000 ohms should be used in series with the lamp, according to manufacturer. General Electric Co.

27—PLASTIC AIR SCRUBBER is light, non-corrosive

The lightweight L-O-C Fume Washer, claimed resistant to corrosion, is designed to remove acid-laden or harmful vapors and plating fumes from air exhausts. Announced as the first of its kind, this fume washer is made of glass fiber-reinforced polyester. Because of its plastic composition, it

weighs only a third as much as many steel units—no extra foundation or special footings are required for installation. Its light weight also permits roof installation, it is noted, and enables installation by plant crew.

Motor and blower of the fume washer are housed separately. The exhaust blower creates a powerful suction to draw fumes into the washer receiver shell. Fumes circulate through rotary action at controlled velocities while their solids and contaminates are washed into the water reservoir by a spray system. The water reservoir requires only infrequent cleaning, company states, and is entered through a

G-B SNAP* ON DISTRIBUTORS

(See ad on facing page)

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, Ball Distributing & Engr. Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
BALTIMORE, Md., Leroy Insulation Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply
Reynolds Aluminum Supply Co.
BROOKLINE, Mass., Homans-Kohler, Inc.
BUFFALO, Industrial Insulation Sales, Inc.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHARLOTTE, N. C., Guy M. Beaty & Co.
CHATTANOOGA, Guy M. Beaty & Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBUS, Santeler Brothers
DALLAS, Insulation Supply Co., Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DES MOINES, Iowa Asbestos Co.
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FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss, Paine Supply Co.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
JACKSON, Miss., Paine Refrigeration & Supply Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Reynolds Aluminum Supply Co.
MILWAUKEE, F. R. Dengel Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher, Inc.
NASHVILLE, Reynolds Aluminum Supply Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, Dravo Corp.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROCKFORD, Ill, Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Reynolds Aluminum Supply Co.
SEATTLE, Western Fibrous Glass Products
SOMERVILLE, Mass., Thermal Insulation Co.
SOUTH BELOIT, Ill., Mott Brothers Co.
ST. LOUIS, The Brauer Supply Co.
The Stovey Company, Inc.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Bakers, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, Walter E. Campbell Co., Inc.
WICHITA, Jamar-Olmen Construction
VANCOUVER, B. C., Fleck Brothers Limited

gb

For more facts circle 606 on Reply Card

TEVA*...best way to compare pipe insulations

Recently a company building a new plant asked us questions about Snap*On, the one-piece pipe insulation of fine glass fibers that simply snaps on pipe. How would 1½" thick Snap*On compare thermally with 2" of another insulation? What effect would it have on material costs? . . . on operating costs?

Our answers were contained in the following TEVA* report:

*Thermo-Economic Value Analysis

PURPOSE . . . to compare Snap*On with Insulation "A".

BASIS OF COMPARISON . . . 15,000 lin. ft. of 8" (average size) pipe
Average Pipe Temperature—350° F
Annual Operating Time—7200 hrs.
Cost of Heat—$0.50/million Btu
Heat Loss Values—Published by manufacturers

CONCLUSIONS

A. HEAT LOSS (Btu/Lin. Ft./Hr.)

Insulation "A", 2" thick	132
SNAP*ON Pipe Insulation, 1½" thick	98
SNAP*ON Savings (Btu/Lin. Ft./Hr.)	34

B. ANNUAL SAVINGS—$ OPERATING COSTS

15,000' x 34 Btu x 7200 Hrs. = 3,672,000,000 Btu
$0.50 (per million Btu) x 3.672 = Annual Saving of $1,836

C. INITIAL SAVINGS—MATERIAL COST

2" Insulation "A", 15,000 lin. ft. @ $2.08	$31,200
1½" SNAP*ON, 15,000 lin. ft. @ 1.404	21,060
MATERIAL COST SAVINGS WITH SNAP*ON	$10,140

*TEVA (THERMO-ECONOMIC VALUE ANALYSIS) IS AN EXCLUSIVE G-B SERVICE. NO OBLIGATION — JUST CALL YOUR LOCAL G-B DISTRIBUTOR

(Listed in the yellow pages in 73 cities)

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

244 W. 10th ST., KANSAS CITY, MO.

The man to watch in 1958

If you're watching costs, keep a sharp eye on your maintenance operations.

Take lamps, for example. The time a man spends to replace a burnt-out lamp — the production lost until and while he installs a new one — these are some of the hidden costs which can greatly exceed the price of the new lamp.

Duro-Test lamps reduce these costly replacements because they have a built-in service life far outlasting other makes. You can prove this by trying them in your hard-to-reach locations or where operating conditions are roughest.

You'll see why economical Duro-Test lamps are the favorites of maintenance men everywhere. For the full story of what longer-lasting Duro-Test lamps can do for you, fill in and mail the coupon below.

Cut lighting costs with DURO-TEST® LAMPS

DURO-TEST CORPORATION
North Bergen • New Jersey

DURO-TEST ELECTRIC, Ltd.
Toronto • Vancouver
Montreal

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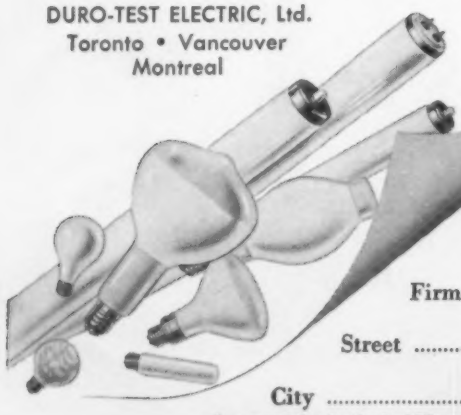


Duro-Test Corp.
North Bergen, N. J.

Send information to:

Mr. .....

Firm .....

Street .....

City ..... State.....

For more facts circle 607 on Reply Card

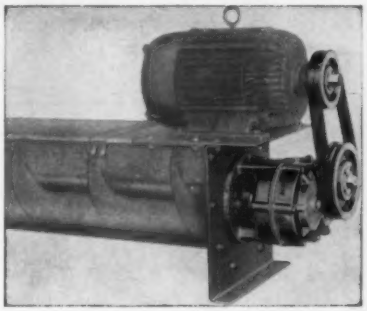
NEW PRODUCTS

(Begins on page 190)

lower access door. Cleaning of spray nozzles is achieved through upper access doors. An automatic recirculating system is available for conservation of water. Line-O-Coat Co.

28—CONVEYOR DRIVE has new design features

Announced as simple to mount and adjust on standard conveyor troughs, this screw conveyor drive consists of a speed reducer with packing gland and driving shaft, which mounts on the trough end. Trough ends also are offered in sizes to fit most standard conveyors. Timken bearings are used throughout the drive to produce ample thrust and radial capacity. The drive is designed to afford utmost protection for the speed reducer unit against invasion by the material being handled by the conveyor. The packing gland

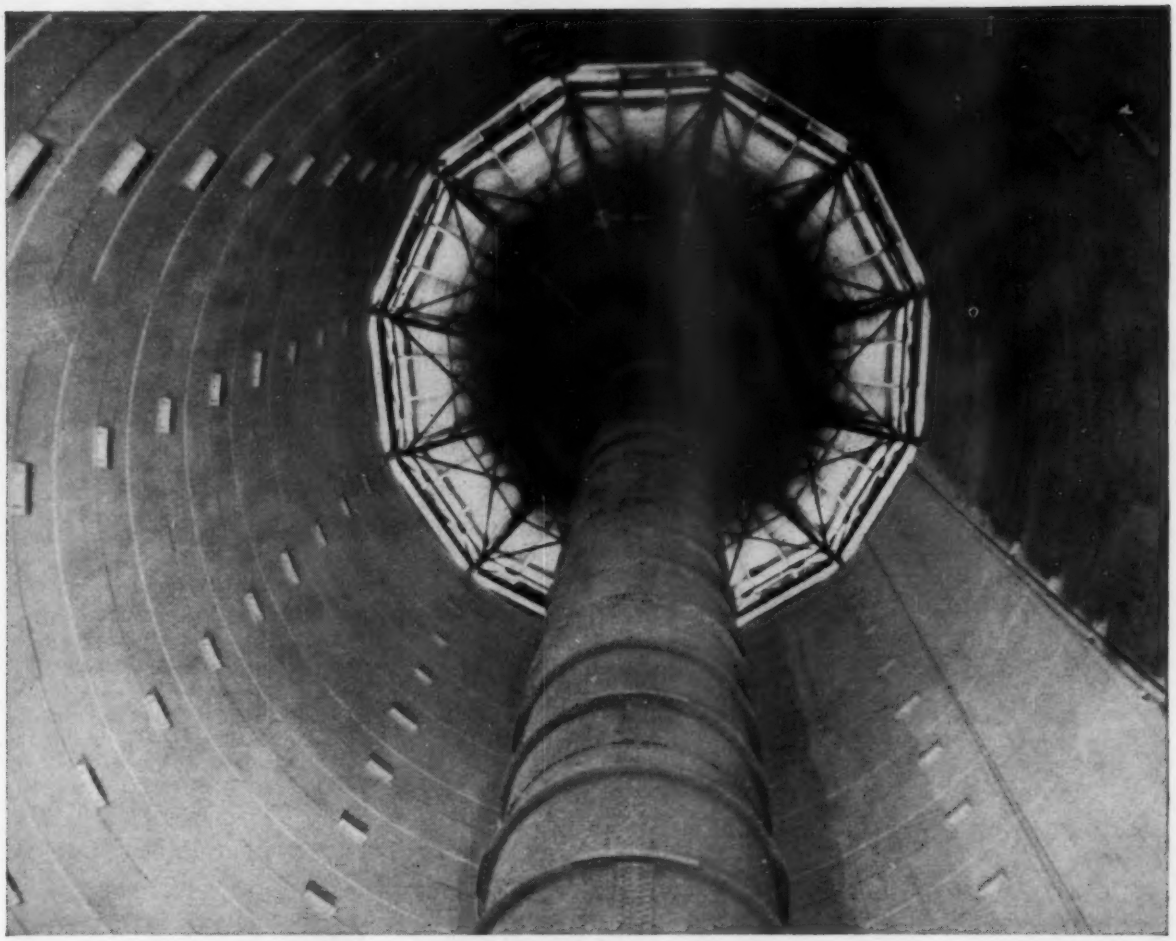


is adjustable from the outside, takes standard packing and may be inspected by sight. It is pointed out that any material that might work through the packing would fall to the floor instead of forcing its way into the reducer. A flinger seal on the shaft also serves to keep foreign material out of reducer seals, and another barrier against contamination is provided by double lip reducer seals.

Simplicity and economy are achieved through elimination of a sliding motor base. Instead, slotted holes in the flange of the reducer let the unit be rotated for adjustment of the V-belt drive center distance. Both motor and drive may be mounted in any position. The screw conveyor drives come in four sizes covering most industrial requirements, and in two ratios: 18 to 1 and 8 to 1. Dodge Mfg. Corp.

29—FILTER-HOSE UNIT takes filtered air into tanks

Filtered fresh air for ventilating tanks, vats, drums, and other areas is available from a portable, self-contained source known as Filtairvent. The unit employs a positive pressure impeller



Special zinc-rich coating made by The Debevoise Company of Brooklyn protects interior of surge tank and equalizing pipe by sacrificial action. Vehicle is only a small portion of final coating, thus the extra durability of Parlon fortification is extremely important.

WATER, WATER EVERYWHERE BUT NOT A SPECK OF RUST

. . . because it's protected with Parlon®

Few maintenance men face a greater challenge than those responsible for hydroelectric plants. Varying water levels and high turbulence mean constant trouble from wet atmospheric exposures and dissolved oxygen. Surge tank and penstocks, butterfly valves and piping all are exposed to corrosive attack.

That's why, in this installation, a special zinc-rich paint was chosen. And, even more important, the vehicle used as a binder is fortified with major amounts of Parlon chlorinated rubber. With its hardness, durability and resistance to corrosion, Parlon is ideally suited for such special metal paint formulations.

In fact, wherever metal, wood or concrete must withstand the corrosive attacks of water, acid or alkali, Parlon-based finishes are providing longer service at lower long-term cost. We'll be glad to tell you how a Parlon formulation can solve your specific maintenance problem. Just write for details.

Cellulose Products Department

HERCULES POWDER COMPANY

INCORPORATED

900 Market Street, Wilmington 99, Delaware

For more facts circle 608 on Reply Card

CR57-2

NOELTING

Faultless Casters

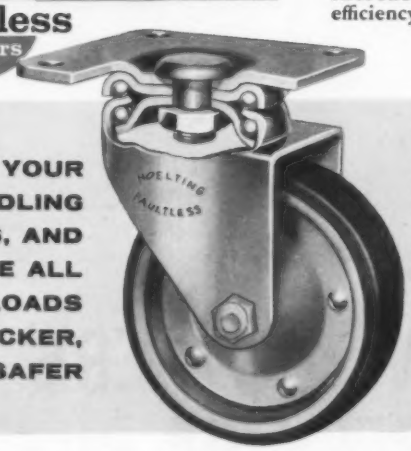
move −306° Liquid Nitrogen Safely!

General Electric Semi-Conductor Plant, Buffalo, selected Series 1100 and 1700 Casters for the extremely critical job of moving −306° liquid nitrogen *in and out* of doors. Vacuum containers holding liquid gas remain on Faultless Castered trucks continuously for swift, sure delivery to the exact spot when needed. Because of the extremely low temperature of the gas, safety is important. Contact with the skin would cause a severe burn.

Easy rolling, easy swiveling Faultless Casters assure shock-free movement—dangerous manual handling is avoided. Another way in which Faultless Casters increase materials handling efficiency for men in industry.

Faultless Casters

CUT YOUR HANDLING COSTS, AND MOVE ALL LOADS QUICKER, SAFER



Series 1100 Double Ball Bearing Swivel Faultless Casters have 2 large-dia. hardened raceways and 2 full rows of hardened, ground ball bearings for maximum swiveling ease. The top and lower ball retainers and horn are formed of heavy gauge steel. Renewable Rubber Tired Wheels operate quietly and efficiently.

Series 1700 Rigid Plate Casters feature an exceptionally strong horn construction and are available with wheel types and sizes, load ratings and overall heights to match Companion Series 1100 Swivel Plate Casters.

ASK YOUR DISTRIBUTOR!

Your Faultless Industrial Distributor will be glad to serve as your expert on casters and wheels. He stocks Faultless Casters and is prepared to offer "plus value" by recommending the right type, load capacity and wheels to suit your requirements. He is listed in your phone directory under "Casters."

Write for FREE Condensed 20-page Caster Catalog.

Faultless Caster Corporation
Evansville 7, Indiana

Send copy of condensed 20-page Caster Catalog, 157-G

Name_____

Firm_____

Address_____

City_____ State_____

For more facts circle 609 on Reply Card

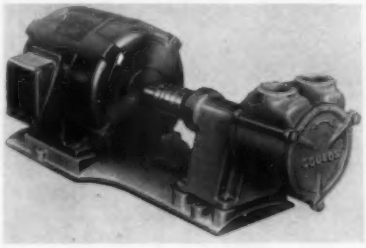
NEW PRODUCTS

(Begins on page 190)

to deliver a rated 560 cfm of air through a 20-ft length of 8-in. diam synthetic fabric hose. Contained within the hose is a 6-ft high efficiency flame-proofed filter, of sufficient area to permit operation for a year or more in average dusty conditions with negligible loading. It may be removed and shaken to restore suction as required. For portability and storage the filter-hose combination can be wadded down into compact size. When used as a man-cooler, it is detachable as a single element by means of a quick-acting latch fastener. The trunion mounted cylinder may be rotated through a 120-deg arc to direct air stream up or down. A switch mounted on the enclosure is connected with a plug-in cord and with the 110 v 1 phase continuous duty ⅓-hp motor. Dustender Co.

30—LIQUID RING PUMP for transfer service use

Light weight, quick self-priming action and the ability to handle air alone, liquid alone, or a combination of air and liquid provide maximum utility for the Fig. 2520 Pump, manufacturer announces. It is available with motor



for permanent installations or mounted on heavy duty casters for portable utility use. It may also be had for use with V-belt drive. Centripetal action of the liquid ring pump directs liquid toward the center to provide the rapid priming necessary for transfer or similar applications. Access to the interior is possible through casing cover without disturbing pipe connections. Suction and discharge are 1½ in. The pump comes in cast iron or AISI 316 stainless steel. Goulds Pumps, Inc.

31—LIGHT FIXTURE designed to resist breakage

The Security Fluorescent Light Fixture fits flush against ceiling or wall and its Plexiglas lens can resist virtually any human attack on it, says manufacturer. It can be opened for re-lamping only with a special tool. When closed the fixture is dust-proof, bug-proof, and water-proof, it is stated,

Hall Industrial Water Report

VOLUME 6 MARCH 1958 NUMBER 2

Steam-Electric Power Plants Have to Keep Rolling

If they don't, our whole complex machinery of civilization suddenly dies. Mills go down, office buildings go dark, air conditioning stops—even television is blinded.

Undisciplined water can cause unscheduled outages. That is why upwards of 300 utilities and more than 2500 industrial steam generating plants retain Hall Laboratories to help them avoid water problems and to solve them when they do occur. This is a most important part of Hall's activities on all kinds of industrial water—cooling water, service water, process water, waste water.

Disappearing Phosphate

One summer the operators in a Midwestern utility plant were puzzled by the disappearance of boiler water phosphate residuals over a number of consecutive week ends. Then to their dismay, boiler tubes began to fail as a result of scale formation.

It was obvious to Hall Engineer J. F. Nelson that the boiler feedwater was being contaminated with hard water over week ends, but finding the point of contamination proved difficult. Innumerable samples of feedwater drawn hourly by the operators showed only the usual 0.5 ppm or less of hardness. However, one night when the air conditioning load dropped abnormally because of cooler weather, hardness showed up. It was traced to a small boiler feed pump used only for light loads. Hard water used for sealing was leaking into the pump suction when load was sufficient to reduce the pressure below that of the sealing water.

Diagnosis had been difficult because contamination occurred only with the small pump used when loads were light and only when this pump was operated at full capacity. These conditions were experienced mainly over week ends.

As with most problems, correction was easy once a satisfactory diagnosis had been made. Substitution of condensate for hard water as gland sealing water eliminated the contamination regardless of load.

An Opportune Visit

On a routine visit to a western utility plant Hall Engineer C. L. Fitzgerald found management trying to decide what to do about preparation of makeup water for a new steam-electric unit. The inclination was to use existing evaporators because of a $100,000 price tag on demineralizing equipment. How to pretreat evaporator feedwater was the pressing problem.

The existing pretreating equipment consisted of an old lime-soda plant operated batchwise in the cold. Consideration was being given to costly, extensive repair work on the old plant and to installation of individual chemical feed tanks and proportioning pumps for the evaporators. Fitzgerald agreed that the changes contemplated would facilitate water treatment and improve evaporator feedwater conditions and vapor quality. However, he was quick to propose an alternative which would involve lower capital investment and operating cost.

Fitzgerald's recommendation was to scrap the existing equipment and to replace it with sodium zeolite softeners costing approximately $2000. Two existing tanks could be used for storage of softened water and one chemical tank and proportioning pump would suffice to feed chemicals into the water line to the evaporator preheater. This arrangement would not only produce excellent quality water for the evaporators but it would do so with a minimum of attention and at low cost.

The scheme proposed was not hard to sell to management. Capital expenditure dropped by stages from the first considered $100,000 to a final figure of close to $2000. The daily saving in chemical cost was sufficient to amortize the expenditure in little more than one year.

Why So Much Copper

When a routine analysis disclosed the presence of an unusually high concentration of copper in the recirculating cooling water at a midwestern city light plant, the operators were justifiably alarmed. That the copper was accelerating corrosion of steel was indicated by a steel test strip removed from the cooling water system. Along with severe pitting, the strip showed copper plating.

No copper compound was being used as an algaecide. Furthermore, routine checks showed the pH value of the circulating water to be 8.0, high enough to control corrosion of copper alloy condenser tubes.

Hall Engineer W. E. Pfeiffer reasoned that the copper source had to be the condenser tubes. Perhaps pH control was not really as good as indicated. Upon investigation, he found that the operators, to facilitate acid feeding, had changed the point of application and were feeding intermittently at hourly intervals. Further determinations revealed that while the pH value of the circulating water at the condenser outlet was 8.0 when acid feed was started, during the short period of acid introduction it dropped to 3.0.

With the problem in focus, changes were made to feed acid properly and thus return to normal the copper content of the water and the operator's peace of mind.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve your particular water problems, write, wire or call address below.

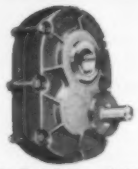
Water is your industry's most important raw material. Use it wisely.

HALL LABORATORIES
DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

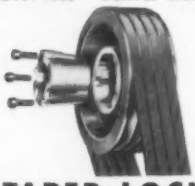
Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 610 on Reply Card

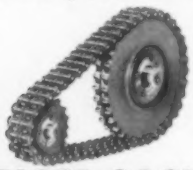
DODGE PRODUCTS you should know



TORQUE-ARM
SPEED REDUCERS
Cost less—deliver more!



TAPER-LOCK
SHEAVES
Easy on—easy off! Mount flush!



TAPER-LOCK
SPROCKETS
No reboring—no waiting!

●

Write for Bulletins!

- Torque-Arm Speed Reducers. 15 sizes—1 to 100 hp. Bulletin A-637
- Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661
- Taper-Lock Sprocket and Dodge Roller Chain data. Bulletin A-644

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 611 on Reply Card

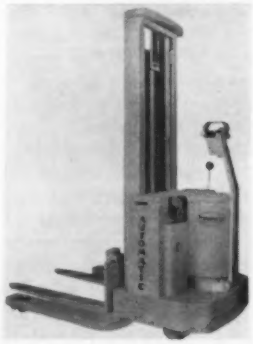
NEW PRODUCTS

(Begins on page 190)

and can be washed with a hose at full pressure. This fixture is suggested for locations where rough usage or vandalism can be expected. It is available in units to carry two, three or four fluorescent lamps. An optional feature available is an 8-w "night lamp" for use in providing a low-illumination light when the main tubes are turned off. Ruby Lighting Corp.

32—WALKIE STACKER in a new shorter length

By means of a newly designed powerhead, reduction of length has been achieved in the Model WAT Transporter, an electric powered pallet type straddle walkie stacker. It is reported especially adaptable to narrow aisle



requirements and pallet rack storage conditions. The stacker's lift reaches up to 130 in. with standard uprights of 83-in., and is available with mono- or duo-type masts, the latter giving maximum free lift of 62 in. The stacker comes in a 4000-lb capacity model with telescopic uprights and a 6000-lb model with non-telescopic uprights. Standard on this and optional on the lighter-capacity one is a Class H silicone motor. Automatic Transporation Co.

33—PIPE COMPOUND forms permanent fusion bond

Named "PVC," this plastic pipe compound has been developed for the permanent bonding of rigid polyvinyl chloride pipe sections and fittings. The bonding agent is formulated from pure, unmodified polyvinyl chloride, company points out, so that the cemented joint is just as chemically resistant as the pipe itself. According to manufacturer, the plastic pipe compound quickly dissolves surfaces of plastic pipe and then fuses them together to produce a permanent fusion bond which cannot be separated because it becomes an integral part of the pipe. The viscous cement is applied by brush. Because of its high solids content, it can also be used effectively on loose fitting joints. Drying rate is slow enough, company says, to allow its use on large diameter pipe. Schwartz Chemical Co., Inc.

34—HEAT TRANSFER MEDIUM for snow-melting systems

Dowtherm SR-1 is an ethylene glycol heat-transfer medium for use in snow-melting systems. It contains phosphate-type corrosion inhibitor. Company claims that this inhibitor is more effective in the temperature range at which snow-melting systems operate than inhibitors used in many products. Dowtherm SR-1 circulates in snow-removal systems at approximately 140-160 F. It may be heated with steam in a shell-and-tube exchanger or directly in a boiler. Company says it will help assure continued protection with Dowtherm SR-1 by periodically analyzing samples at no cost to customer. Such analysis is designed to assure proper glycol concentration, pH control, corrosion control and heat-transfer efficiency. The Dow Chemical Co.

35—POWER SWEEPER does tough, dirty sweeping

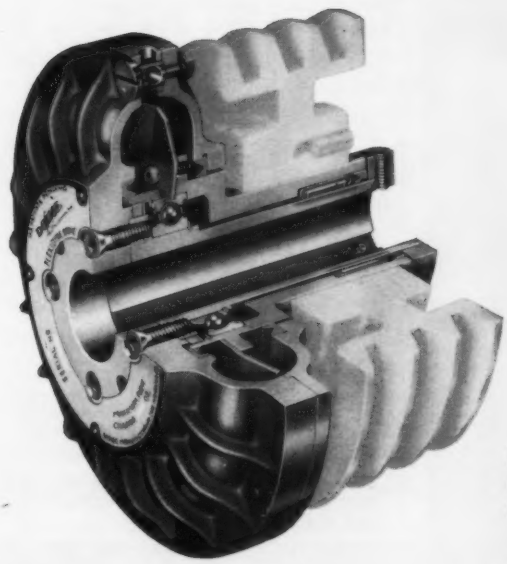
An all-purpose power floor sweeper, the Hydra-Sweep 51 is introduced for medium to large plants and parking areas. Hydraulically driven and designed for rugged duty, the sweeper also incorporates such safety features as a one-pedal Magic-Touch drive, wrap-around bumper, retractable side brooms and a design that lets the operator look ahead while sweeping. One adjustable side broom lets the unit sweep aisles from 36 to 51 in. wide. An additional side broom is available to bring the total sweeping width to

66 in. Brooms operate at constant speed independent of forward speed.

At speeds to 8 mph, the Hydra-Sweep 51 can sweep over 100,000 sq ft of floor space an hour. Manufacturer states that the brooms clean all types of floors and surfaces from wood block to black top. The sweeper has a minimum floor clearance of 3 in.—enough to permit pickup of 2-by-4's, newspapers, tin cans and pop bottles.

WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



FLEXIDYNE

THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

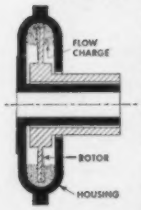
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 2700 Union St., Mishawaka, Ind.

HOW FLEXIDYNE WORKS



The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE

of Mishawaka, Ind.

For more facts circle 612 on Reply Card

another industrial glazing problem

SOLVED!

Photographs courtesy of The Firestone Tire and Rubber Company

structoglas 'A'

REINFORCED PLASTIC PANES CUT MAINTENANCE AND LIGHTING COSTS

Dollar-savings start the moment you install STRUCTOGLAS "A" fiberglass-reinforced plastic panes and panels. Here's why:

★ STRUCTOGLAS "A" installs quickly and easily . . . no need for extra-careful handling.
★ Cuts replacements costs up to 90% because it's shatterproof.
★ Stops breakage caused by vibration, twisting, vandalism, etc.
★ Provides years of glare-free natural daylight that helps slash lighting costs.
★ Resists fading, discoloring and weathering . . . does not "alligator" like other "look alike" products.

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7090-138

FOUR EASY STEPS TO INSTALL

CLEAN SASH | INSERT PANE | INSERT CLIPS | FACE PUTTY

See our catalogs in Sweet's Plant Engineering and Architectural Files.

For more facts circle 613 on Reply Card

NEW PRODUCTS

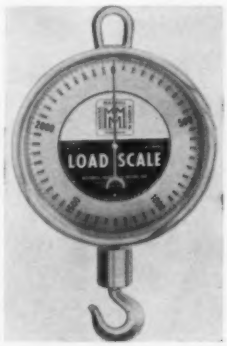
(Begins on page 190)

The unit is reported powerful enough to double as a tow truck, to move wheeled loads up to 7 tons at 7 mph. For this it is equipped with a heavy-duty tow-eye. Industrial Sweeper Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 251-252.

36—LOAD SCALES are light in weight, rugged

MMM Load Scales are reported to reduce handling costs and save time where materials must be weighed, and to promote greater safety by warning



against overloading of hoisting equipment. Accuracy is within 2/10 of 1 per cent of the full scale reading, according to manufacturer, and the mechanism is sensitive to weight changes of less than ½ of one division. The scale weighs only 42 lb but is described as ruggedly constructed to withstand rough usage, and as unaffected by heat or cold within normal temperature ranges. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

37—MEMORY METER retains readings taken

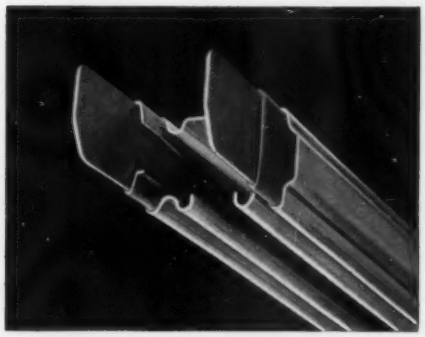
This "memory meter" is designed to retain indefinitely a reading taken at any desired instant. It is described as a simple, reliable means of achieving results formerly requiring fairly complicated equipment. The instrument is declared especially suitable for applications where readings at a given time must be known but cannot be noted immediately—as in remotely located meters. According to manufacturer, readings may be taken at any point on the meter scale, and not necessarily

New Universal Lighting System—

for flexible, low-cost lighting

Here's efficiency and economy, too. BullDog's new 20-amp Universal Lighting System both feeds and supports lighting fixtures . . . requires no supplementary fusing. Fixtures can be positioned at any spot throughout the entire system . . . are quickly and easily moved to meet changes in lighting requirements. No rewiring or electrical downtime, either.

Listed by Underwriters' Laboratories, this new Universal Lighting System assures maximum flexibility at minimum cost. Check its many advantages. Consult your electrical contractor or BullDog field engineer. Or write BullDog Electric Products Co., Detroit 32, Michigan. © BEPCO



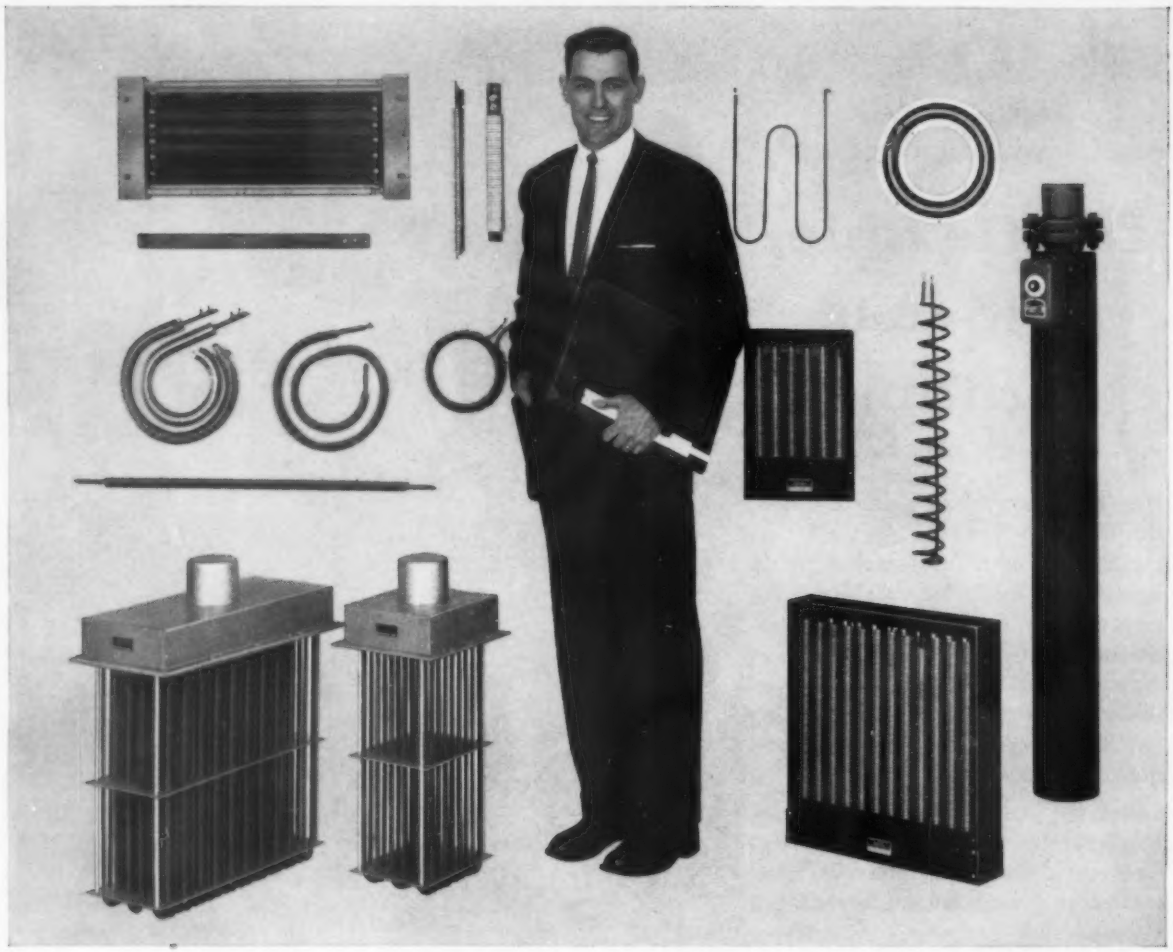
CROSS SECTION of new, low-cost 20-amp Universal Lighting System. Movable weight supports and twistout plugs speed rearrangement, addition or removal of fixtures, eliminate rewiring and electrical downtime.

BULLDOG

BullDog Electric Products Co., Detroit 32, Mich. A Division of I-T-E Circuit Breaker Co.
BullDog Export Division: 13 East 40th St., New York 16, N.Y.
In Canada: BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

For more facts circle 614 on Reply Card

Need safe, clean, precise heat on your work?



Call the Chromalox man for the **ANSWERS!**

Chromalox offers you a complete range of electric heaters to fit the temperature requirements of your jobs and the physical dimensions of your equipment.

Your Chromalox Representative—the man with the answers to your heating problems, routine or unusual—can supply a Chromalox model for any industrial air heating job, regardless of the size. These heaters are widely used . . .

- Where a constantly dependable heat source is needed
- Where temperatures must be precisely controlled
- Where products or processes call for dustless and moisture-free heat
- Where heat in existing ducts or equipment is not enough (compact Chromalox models make ideal heat boosters)
- Where space limitations prevent use of any other heat source
- Where any other heat source may be hazardous

Units are available for finish baking, heat treating ovens, annealing ovens, core and armature drying ovens and similar applications. Operating temperatures up to 1000°F are easily, accurately maintained by thermostat control. Standard units are quickly installed in existing ducts and multiple circuits can be supplied for modulating the heat output.

Call in the man with the answers to your processing problems—your experienced Chromalox Electric Heating Specialist (see listing on opposite page). He'll be glad to show you case histories similar to your own, and discuss the application that will give you the results you want.

C-3184

CHROMALOX® Electric Heat

Edwin L. Wiegand Company

7553 Thomas Boulevard, Pittsburgh 8, Pennsylvania • CHurchill 2-6400

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for the man with the ELECTRICAL ANSWERS to your heating problems

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TRinity 5-7244

BALA-CYNWYD, PA.
J. V. Calhoun Co.
349 Montgomery Ave.
MOhawk 4-6113

BALTIMORE 18, MD.
Paul V. Renoff Co.
333 E. 25th St.
HOpkins 7-3280

BLOOMFIELD, N. J.
R. L Faber & Associates, Inc.
1246 Broad Street
EDison 8-6900

BOSTON 11, MASS.
Leo C. Pelkus and Co., Inc.
683 Atlantic Ave.
LIberty 2-1941

BUFFALO 2, N. Y.
Niagara Electric Sales Co.
505 Delaware Avenue
SUmmer 4000

CHARLOTTE 2, N. C.
Ranson, Wallace & Co.
116½ East Fourth St.
EDison 4-4244
FRanklin 5-1044

CHATTANOOGA 1, TENN.
H. R. Miles and Associates
P. O. Box 172
Phone 5-3862

CHICAGO 5, ILL.
Fred I. Tourtelot Co.
407 S. Dearborn Street
HArrison 7-5507

CINCINNATI 8, OHIO
The Smysor Company
1046 Delta Avenue
TRinity 1-0605

CLEARWATER, FLA.
J. J. Galleher
617 Cleveland Street
P. O. Box 1376
Phone 3-7706

CLEVELAND 12, OHIO
Anderson-Bolds, Inc.
2012 W. 25th Street
PRospect 1-7112

DALLAS 26, TEXAS
L. R. Ward Company
3009-11 Canton Street
RIverside 1-6279

DAVENPORT, IOWA
Volco Company
215 Kahl Bldg.
Phone: 3-2144

DENVER 2, COLO.
E. & M. Equipment Co.
2415 15th Street
GLendale 5-3651
GEnesee 3-0821

DES MOINES 14, IOWA
Midwest Equip. Co. of Iowa
842 Fifth Avenue
CHerry 3-1203

DETROIT 38, MICH.
Carman Adams, Inc.
15760 James Couzens Hwy.
UNiversity 3-9100

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L. R. Ward Company
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CApitol 5-0356

INDIANAPOLIS 4, IND.
Couchman-Conant, Inc.
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MElrose 5-5313

KANSAS CITY 6, MO.
Fraser D. Moore Co.
106 E. 14th Street
VIctor 2-3306

LOS ANGELES 15, CALIF.
Montgomery Brothers
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RIchmond 7-9401

MIDDLETOWN, CONN.
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DIamond 6-9606

MILWAUKEE 3, WIS.
Gordon Hatch Co., Inc.
531 W. Wisconsin Avenue
BRoadway 1-3021

MINNEAPOLIS 4, MINN.
Volco Company
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FEderal 6-3373

NASHVILLE 4, TENN.
H. R. Miles and Associates
2500-B Franklin Road
CYpress 2-7016

NEW YORK CITY, N. Y.
See "Bloomfield, N. J."
WOrth 4-2990

OMAHA 2, NEB.
Midwest Equipment Co. of Omaha
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ATlantic 7600

PHILADELPHIA, PA.
See "Bala-Cynwyd, Pa."
GReenwood 3-4477

PITTSBURGH 6, PA.
Woessner-McKnight Co.
1310 Highland Bldg.
115 S. Highland Avenue
EMerson 1-2900

PORTLAND 9, ORE.
Montgomery Brothers
1632 N.W. Johnson Street
CApitol 3-4197

RICHMOND 26, VA.
(Branch, Charlotte)
Phone 88-8758

ROCHESTER 4, N. Y.
Niagara Electric Sales Co.
133 Clinton Avenue, South
HAmilton 6-2070

ST. LOUIS 1, MO.
C. B. Fall Company
317 North 11th Street
CHestnut 1-2433

SAN FRANCISCO 3, CALIF.
Montgomery Brothers
1122 Howard Street
UNderhill 1-3527

SEATTLE 4, WASH.
Montgomery Brothers
911 Western Avenue
SEneca 3270

SYRACUSE 6, N. Y.
R. P Smith Co., Inc.
2507 James Street
HOward 3-2748

WICHITA 2, KANS.
Fraser D. Moore Co.
Room 211 Derby Building
352 N. Broadway
AMherst 2-5647

NEW PRODUCTS

(Begins on page 190)

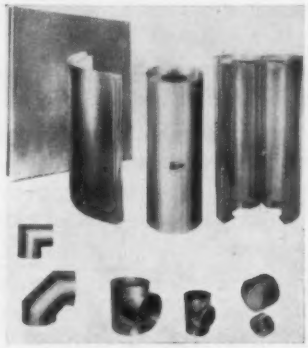
at the maximum reached by the signal.

The unit is essentially a sensitive panel meter with a rear-mounted solenoid that is normally energized so that its plunger is retracted. When a reading is desired, the solenoid is de-energized. Its plunger pushes against the back of the face plate, normally held away from the pointer by two small springs at its base. The pointer is held fast at the reading instant between face plate and a clamper plate. If desired. operation of the solenoid can be reversed so that the coil is normally de-energized. The memory meter comes in sensitivity ranges from a few microamperes or millivolts to 50 amp or 500 v, d-c or a-c. Assembly Products, Inc.

38—METAL INSULATION minimizes heat losses

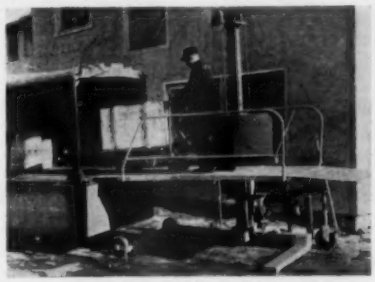
An all-metal insulation, Mirror Insulation utilizes a reflective principle similar to that employed in a thermos bottle. The insulation can be constructed to handle industrial temperatures of -400 to 2000 F. Due to its broad temperature limits, this product can be used for both single-and dual-temperature service applications heretofore too severe for many insulating materials. Reflective insulating units are reported advantageous in such high temperature applications as the manufacture of polyethylene plastics, and in the low temperature service of handling liquefied gases.

Mirror Insulation comes in prefabricated units for pipes, fittings, vessels, equipment, boiler castings and ducts. Basically, it is made up of air spaces, partitioned by reflective metal sheets—most of its volume consisting of air. This "mass-less" product is light in weight, facilitating handling and installation. Because of low cost and good reflective properties, aluminum alloys are normally used for the majority of components in this insulation for a temperature range of -100 to 1000 F. Stainless steel and other alloys are utilized where extreme temperatures and other conditions are involved. Of welded and riveted construction, the insulation, as furnished, has an integral outer case of heavy gage metal. Standard forms are usually secured to insulated surfaces by stainless steel bands, by sheet metal screws. For fast access, the product is available in a quick-removable type with a snap-latch feature. Mirror Insulation Co., Inc.



39—DOCK ELEVATOR is versatile loading unit

The Express functions as a mobile, adjustable loading dock and work platform, to speed loading operations and material movement, or provide stable, elevated platform for overhead operations. It is reported particularly valuable where permanent docks are not available or vary in height from standard, or for bridging between docks or carriers. The Express is also suggested for elevating loads for top tier storage. It is designed to equalize height differences up to 10 ft from base level. Equipped with interlocking safety devices and pushbutton controls, the Express comes in four standard capacities from 1½ to 6 tons. Platform sizes range up to 5-ft 10-in. by 11-ft 8-in. Lodige Mfg. Corp.



40—METERING PUMPS for corrosives, chemicals

Retaining the Step-Valve liquid end and other features of company's standard line with which it is interchangeable, these controlled volume diaphragm pumps have Teflon diaphragms sealing the liquid ends from plunger and housing. They are positive displacement pumps designed for handling toxic, corrosive or costly chemicals, and are claimed accurate to within ± 1 per cent. The plunger displaces hydraulic fluid which, in turn, strokes the diaphragm to impart pumping action through double ball checks. There is no mechanical connection between diaphragm and plunger. Available with maximum capacities from 1.1 to 138 gph and

81.8%* of plant engineers say...

"steel enclosed trolley busways cut maintenance costs"

Flexible Feedrail systems, in capacities from 60 to 500 amperes, provide convenient movable power sources for cranes and hoists; production, conveyor assembly, and moving test lines; portable and machine tools; cutting and sewing rooms; business machines; lighting; and motor control.

Why? Because a steel enclosed trolley busway —Feedrail—delivers trouble-free power through *overhead mobile outlets that move with the load.*

You eliminate long, dragging power cords, cables and reels—as well as the cost of inspecting, maintaining and replacing them. That adds up to considerable savings in both maintenance and downtime.

More! Feedrail speeds up production, reduces accidents, protects buildings and equipment.

There's a Feedrail system that's just right for your crane or hoist, portable tools and other plant equipment. Feedrail is surprisingly easy to install, can be quickly extended or relocated —never becomes obsolete!

Find out now how Feedrail can help you lower maintenance costs in your plant. Send for Bulletin. Write Dept. P3.

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For more facts circle 616 on Reply Card

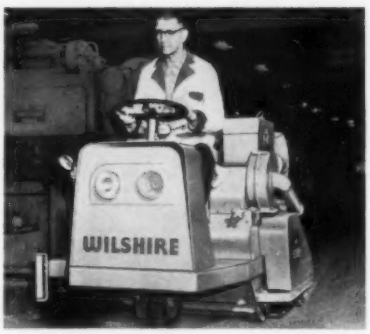
NEW PRODUCTS

(Begins on page 190)

pressures to 2000 psi, the pumps have manual or automatic capacity adjustments ranging from 0 to 100 per cent. Milton Roy Co.

41—POWER SWEEPER is rugged, efficient unit

Model 2436 Electrisweeper is a battery powered unit incorporating several new design features in addition to improved sweepability and rugged construction. Among features announced are standard automotive cam and lever



shockproof steering, foot accelerator with automatic power release, electric forward and reverse control (without shifting gears), fingertip control mounted on steering column for operating hydraulics. The new dust system with high volume impeller type blower delivers dust into a separator chamber which allows heavier dust to be dropped before reaching the 5-¾ cu ft filter. The filter automatically empties at time the hopper is dumped, it is pointed out, avoiding removal of filter or air blow back for cleaning. Manufacturer states that by using two 12-v industrial type batteries with a minimum of 360 amp-hr. the sweeper can sweep a full 8 hr shift without recharge. Wilshire Power Sweeper Co.

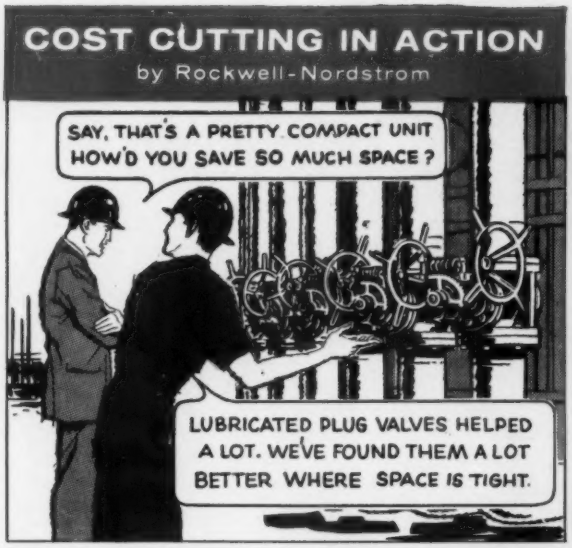
42—MINIATURE LUBE SYSTEM is low cost, low pressure

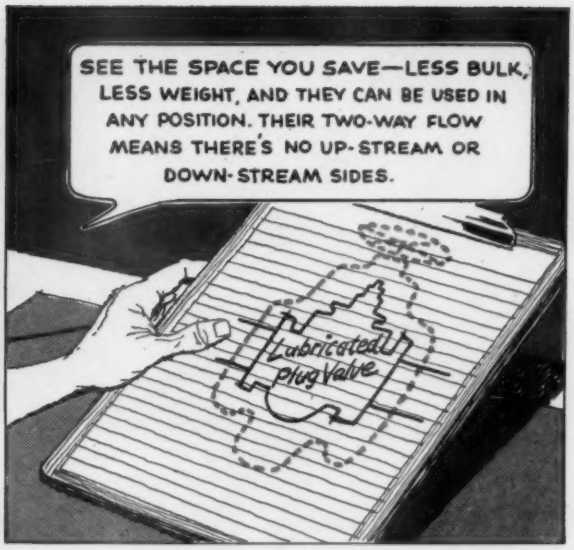
Accumite is a low pressure, positive displacement type of miniature lubrication system for use on machinery having numerous bearings and limited installation space. Accumite centralized systems are specifically designed to lubricate machinery previously not considered for centralized systems for economical or structural reasons. Among these are: production machines; high precision machines; machines with many bearings; difficult to lubricate machines, where personnel safety is endangered.

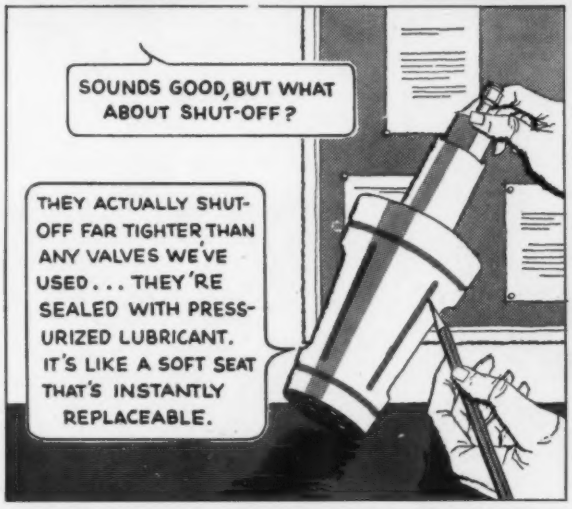
Heart of the system is a miniature

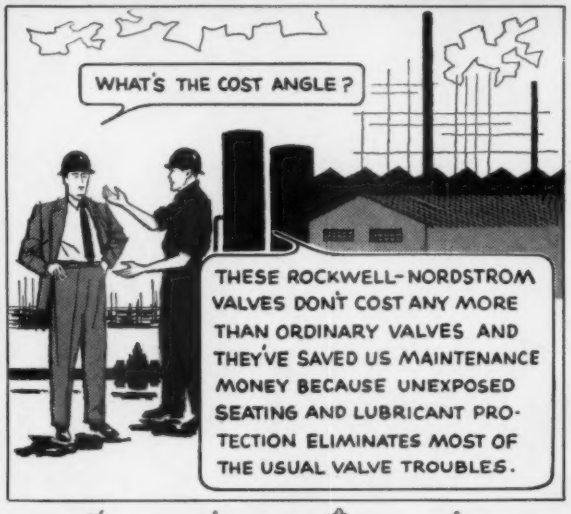
COST CUTTING IN ACTION

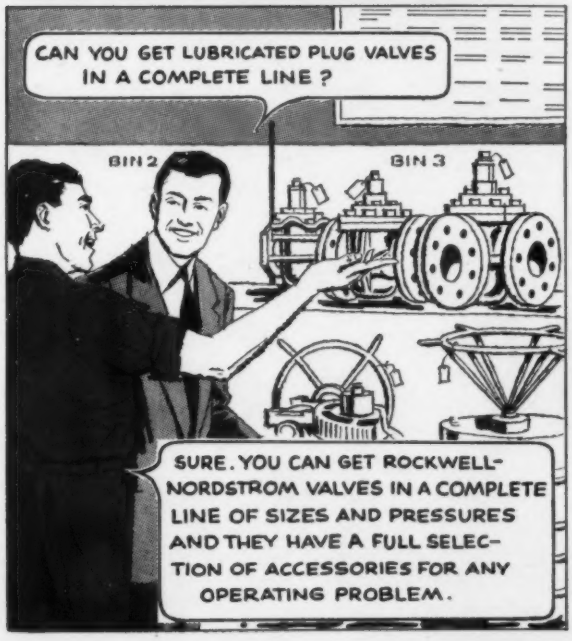
by Rockwell-Nordstrom


SAY, THAT'S A PRETTY COMPACT UNIT HOW'D YOU SAVE SO MUCH SPACE?
LUBRICATED PLUG VALVES HELPED A LOT. WE'VE FOUND THEM A LOT BETTER WHERE SPACE IS TIGHT.


SEE THE SPACE YOU SAVE—LESS BULK, LESS WEIGHT, AND THEY CAN BE USED IN ANY POSITION. THEIR TWO-WAY FLOW MEANS THERE'S NO UP-STREAM OR DOWN-STREAM SIDES.
Lubricated plug Valve


SOUNDS GOOD, BUT WHAT ABOUT SHUT-OFF?
THEY ACTUALLY SHUT-OFF FAR TIGHTER THAN ANY VALVES WE'VE USED... THEY'RE SEALED WITH PRESS-URIZED LUBRICANT. IT'S LIKE A SOFT SEAT THAT'S INSTANTLY REPLACEABLE.


WHAT'S THE COST ANGLE?
THESE ROCKWELL-NORDSTROM VALVES DON'T COST ANY MORE THAN ORDINARY VALVES AND THEY'VE SAVED US MAINTENANCE MONEY BECAUSE UNEXPOSED SEATING AND LUBRICANT PRO-TECTION ELIMINATES MOST OF THE USUAL VALVE TROUBLES.


CAN YOU GET LUBRICATED PLUG VALVES IN A COMPLETE LINE?
BIN 2
BIN 3
SURE. YOU CAN GET ROCKWELL-NORDSTROM VALVES IN A COMPLETE LINE OF SIZES AND PRESSURES AND THEY HAVE A FULL SELEC-TION OF ACCESSORIES FOR ANY OPERATING PROBLEM.

ROCKWELL-Nordstrom VALVES

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Department CS Pittsburgh 8, Pa.

☐ Please send me complete information on Rockwell-Nordstrom valves for process, industrial and manufacturing flow control.

☐ Please send me the name of your nearest distributor . . . ask him (to) (not to) call immediately.

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____

For more facts circle 617 on Reply Card

Self-propelled Diesel Air Compressor does all kinds of plant maintenance work . . .

OPERATING AIR TOOLS. 125 cfm instantly available for every compressed air need.

LOADING MATERIALS. Full cubic yard bucket handles heaped loads up to 4000 lbs.

The Schramm 125 cfm Heavy Pneumatractor can do all types of maintenance jobs in your plant that call for a tractor or compressor. It's a self-propelled air compression plant *and* a wheel tractor—converting instantly from one to the other, right from the instrument panel. No trucks. No towing. No wasted manpower. One man drives *and* operates the Pneumatractor.

Provides extra air—the Heavy Pneumatractor supplies a full 125 cfm of air for operating *extra* tools.

Multipurpose—versatile Pneumatractors shovel, load, trench, dig, grade, backfill, hoist, haul, sweep, pump, spray paint. You name it, they do it!

Cost far less—Pneumatractors save you the expense of a tractor and other special purpose machines. Easily serviced by any engine mechanic.

Save time—no delays; no crews tied up. Pneumatractors *drive* to the job—start work at once.

Diesel or gasoline powered—to suit your exact need and give you maximum economy.

Safer—no fuel hazard. Write for information.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 618 on Reply Card

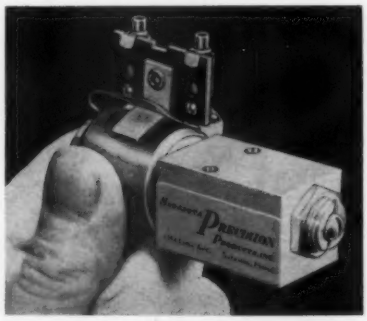
NEW PRODUCTS

(Begins on page 190)

metering valve (slightly larger than a lubrication fitting) which services each bearing individually. This valve is designed to deliver a specified amount of clean lubricant to each bearing connected in the system regardless of bearing clearance or distance of bearing from pump, and to eliminate lubricant drainage from the system when the machine is idle. The system can handle a wide range of lighter grade lubricants, and offers four types of lubricant pumps to pressurize the system lines and actuate the measuring valves. These pumps deliver enough lubricant for 40 to 200 bearings per stroke. Alemite Div., Stewart-Warner Corp.

43—SOLENOID VALVE will pilot larger valves

This high pressure, low capacity direct acting solenoid valve is designed for pilot operation of larger valves. The valve can also be used as a direct acting on-off valve in small hydraulic

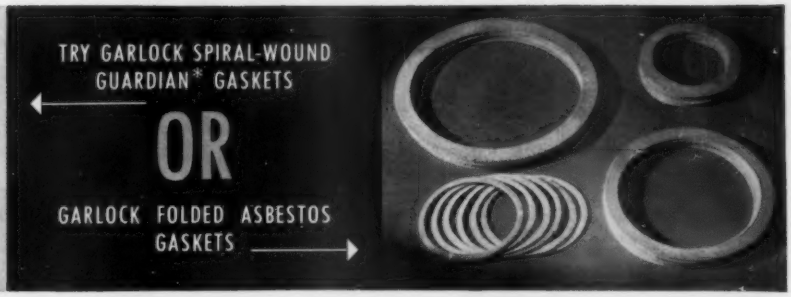


systems, and for high pressure lubricating systems. When two or more are mounted on a sub-plate, they can be used as a three or four-way valve. Gasket mounted, its hardened, ground and lapped poppet and seat are claimed to assure no leakage in off position. The 4½-oz unit is designed for 3,000 psi, and delivers 17 cu in. per minute at 100 psi pressure drop. The valve handles hydraulic oils, kerosene or lubricating oils. It is available in 6 to 48 v d-c, and 110 v a-c. Sarasota Precision Products, Inc.

44—PURGE METER with removable tube and fittings

This purge meter features a removable "snap-in" tube and removable end fittings. Fittings and tube can be removed and replaced in seconds without use of tools. Additional features are corrosion-proof fibre-glass body, a 3-in. scale length that permits better accuracy and reability, a white backing on tube for better visibility, and

Sealing against high temperatures?



Garlock Spiral-wound Guardian Gaskets provide safe, positive sealing at temperatures to 1050° F. and pressures to 2500 psi. . . . and under lighter bolt loads, too! They are recommended for sealing against oils, steam, gases, liquids and most chemicals. In no other type gasket can you vary the compressibility to meet different requirements. They are constructed of spiral wound strips of V-shaped metal alternated with layers of asbestos paper or Teflon. Type metal and filler depend upon application. Ask for folder AD-104.

Garlock Folded Asbestos Gaskets are recommended for use against steam or gases to 600° F. where surfaces are irregular or pitted. They are most commonly used on boiler manholes and handholes, or on flanged joints of column stills or other equipment requiring a soft gasketing. Made of wire-inserted asbestos cloth, specially treated to withstand high temperatures, the gaskets are folded, formed and pressed to produce any desired shape.

Guardian Gaskets and Folded Asbestos Gaskets are just two more examples of the famous "Garlock 2,000" . . . two thousand styles of packings, gaskets, and seals for every need. The *only* complete line. You can ask your local Garlock representative for his unbiased recommendations. Or, write for Gasket Folder AD-162.

*Registered Trademark

THE GARLOCK PACKING COMPANY, Palmyra, N.Y.

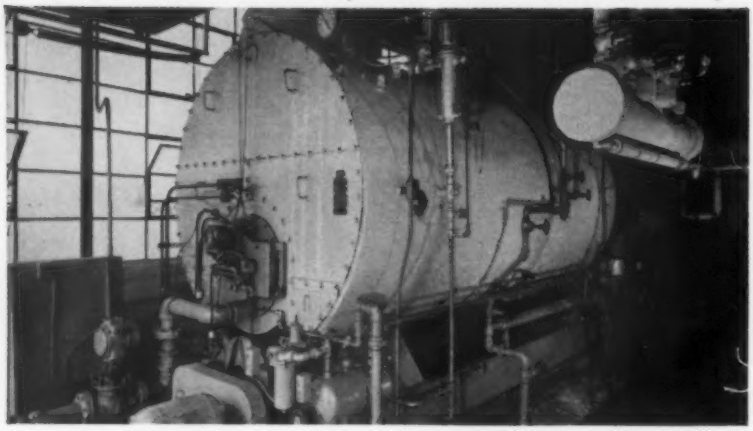
For prompt service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

For more facts circle 619 on Reply Card

Cleaver-Brooks reports on PROCESS STEAM ECONOMY



34 BOILERS – excellent efficiencies minimum maintenance

— National Industrial Laundries, Elizabeth, N.J.

Mr. Freeman A. Godfrey, Chief Engineer, National Industrial Laundries, states, "From actual fuel checks against steam developed, our company is experiencing excellent efficiencies from our 34 Cleaver-Brooks. Loads vary widely in our 20 plants, starting at 100% capacity in the morning hours and reducing to 20% in afternoon.

"Our maintenance story is just as impressive. Due to better combustion, we find it is unnecessary to clean the fireside of boilers more than once every six months. We have not had a serious shutdown due to any lack of emergency service from your field engineers."

Economy and boiler performance like this are typical of hundreds of Cleaver-Brooks installations. Four-pass, forced-draft design has clearly proved its superiority in all types of process steam service.

Today — write for complete information on Cleaver-Brooks boilers: 15 to 600 hp, oil, gas and combination oil/gas firing, steam or hot water for heating and processing. Cleaver-Brooks Company, Dept. C, 364 E. Keefe Ave., Milwaukee 12, Wisconsin.

The 300 hp oil- and gas-fired model LR boiler shown above is installed at Alabama Overall Service laundry in Birmingham, Ala. In addition to this installation, National Industrial Laundries has a total of 32 Cleaver-Brooks boilers in the following plants:

Atlantic Overall Service Scranton, Pa.
Carolina Overall Service Charlotte, N.C.
Central Overall Service Louisville, Kentucky
Colonial Overall Service Richmond, Va.
Delta Overall Service Hattiesburg, Miss.
Dixie Overall Service Greensboro, N.C.
Eastern Overall Service Somerville, Mass.
Floridian Overall Service St. Petersburg, Florida
Gulf Overall Service Atlanta, Ga.
Industrial Uniform Service Chattanooga, Tenn.
Local Overall Service Ft. Worth, Texas
Mechanics Overall Service Newark, N.J.
Mechanics Overall Service Camden, N.J.
Mechanics Overall Service Reading, Pa.
Mechanics Overall Service Alexandria, La.
Mechanics Uniform Service Dayton, Ohio
Southern Overall Service Baltimore, Md.
Texas Overall Service Dallas, Texas
Texas Overall Service Houston, Texas
Tropical Overall Service Jacksonville, Fla.

Cleaver Brooks®

ORIGINATORS OF THE SELF-CONTAINED BOILER

For more facts circle 620 on Reply Card

NEW PRODUCTS

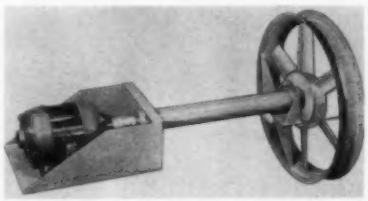
(Begins on page 190)

a snap-on protective Lucite shield over the direct reading tube. Despite advantages of "snap-in" design, the meter costs less than comparable meters, company notes, because of its simplicity. The basic unit costs around $13. Fischer & Porter Co.

Use the Reader Service Cards provided on pages 251-252 to ask for more information on these products. Circle item numbers of products in which you are interested.

45—DIRECT DRIVE FAN for exhausting gases

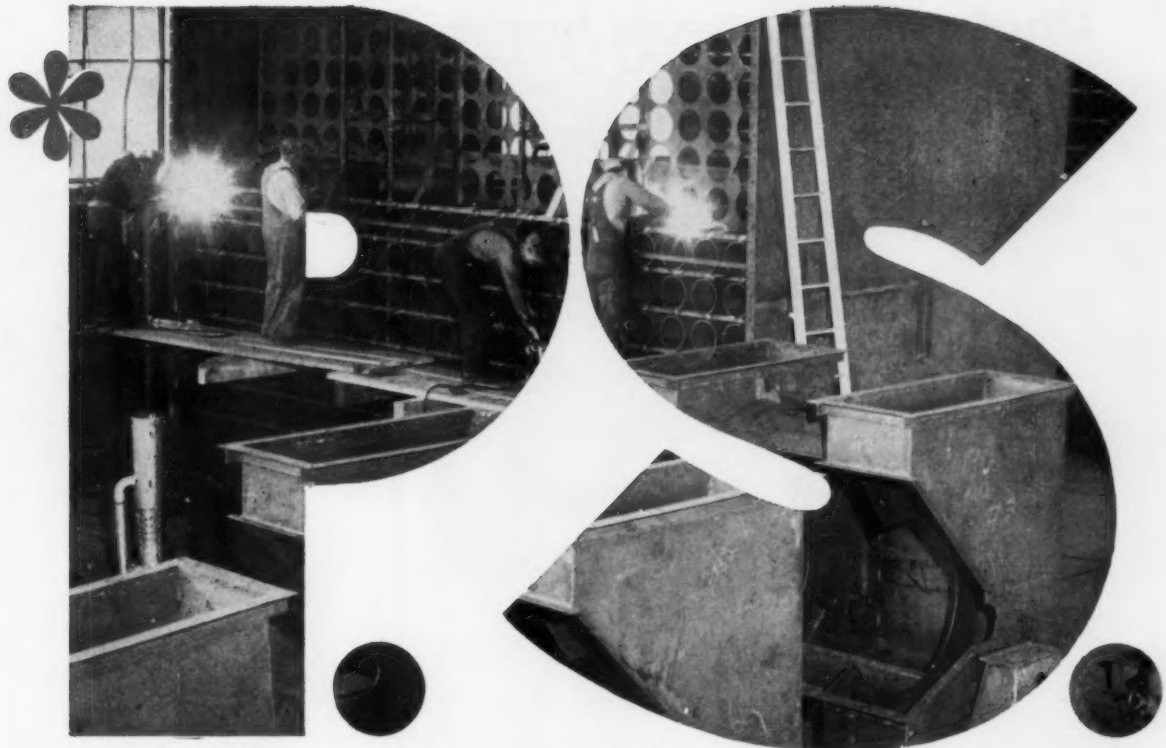
An extended shaft orifice ring fan, the Type ES is designed for operations where the motor must be kept out of the air stream. It is intended for exhausting gases or corrosive fumes, but



may also be used to circulate high temperature air for drying. Featuring an aerodynamic blade design, the fan wheels produce high pressure characteristics yet maintain a low noise level, says manufacturer; and blade angles, large at the hub, decrease to small values at the tips for a uniform air pattern. Steel or aluminum wheels are available with two to eight blades, in fan sizes from 24 to 42 in. Ball bearing motors are designed to operate in horizontal or vertical position. Chicago Blower Corp.

46—VARNISH REMOVER strips off tough, thick coatings

All types of varnish, regardless of toughness and thickness of coating, can be stripped quickly with this nonflammable impregnating varnish remover, says manufacturer. The remover is claimed to strip clean accumulations up to 2 in. thick in 5 hr or less. It is reported to work equally well with air-dried or baked varnishes and to be economical to use because of its quick action and the surface seal which serves to prevent evaporation of stripping power. It is applied by brush or dip. Suggested applications include use



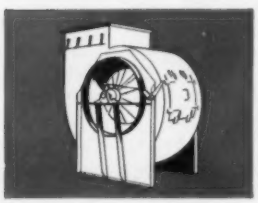
*PROBLEM SOLVERS

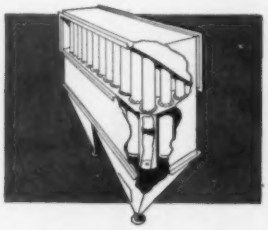
FLY ASH ARRESTOR'S research laboratory, engineering and manufacturing facilities are *totally set up* and especially experienced to provide a "dollar-saving" solution to the most perplexing dust collecting problem. Tell us about your conditions . . . what you want done!

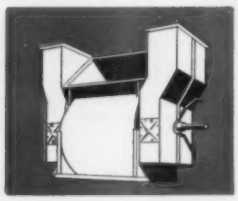
WHIRLEX *dust collecting efficiency begins with "tailored" planning.* Each dust collecting problem . . . whether nuisance elimination or process material recovery . . . gets special study and handling. FLY ASH ARRESTOR engineering solves each problem with a completely integrated, *shop-assembled* WHIRLEX Dust Collector Unit specifically designed and constructed for the job.

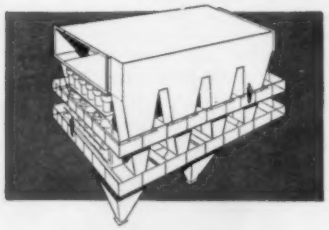
WHIRLEX *heavy-duty* industrial exhaust fans are available to handle any air moving problem. WHIRLEX *standard* forced and induced draft fans are available for boiler applications.

WHIRLEX equipment assures maximum efficiency right from the start . . . and continues to pay off with consistently low operating and maintenance costs.









- CTF Mechanical Gas Centrifuge Collectors • MTSA 9CYT Multiple Cyclone Collectors
- Induced Draft Fans • Forced Draft Fans • Special Duct Work
- Self-Supporting Stacks • Support Structures

FLY ASH WHIRLEX ARRESTOR

Write today for complete engineering data . . .

THE FLY ASH ARRESTOR CORPORATION

286 North First Street **Birmingham, Alabama**

For more facts circle 621 on Reply Card

Choice of the wise buyer who compares...

CM HOISTS

CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 1 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds and fits in a tool box. CM-Alloy load chain.

HAND OR ELECTRIC CHAIN OR WIRE ROPE

CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.

CM TROLLEYS AND CRANES

● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

Call the CM Distributor for catalogs, prices and fast delivery from stock

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION

COLUMBUS McKINNON CHAIN CORPORATION

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For more facts circle 622 on Reply Card

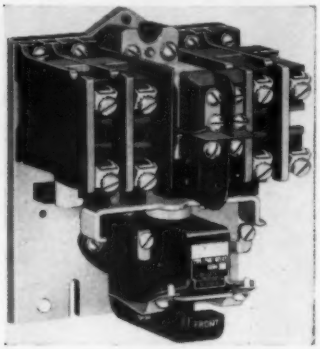
NEW PRODUCTS

(Begins on page 190)

on impregnating baskets, paint hooks, screens, oven floors, electrical components, transformer leads, electronic equipment. London Chemical Co.

47—LATCH RELAY needs no extra vertical height

Mechanically-held latched-in relays without increased vertical height have been added to company's 10-amp control relays. The Type PML Relays come in nine models with from two to 10 poles. Mounting dimensions are standard and parts interchangeable between company's PM Magnetic Relays and the Type PML. Because the latch



unit does not require increased vertical height, magnetic and latch relays may be grouped in rows, as desired. The latch unit occupies the space of only two poles. Since the latch unit coil is designed for continuous duty, it is not necessary to use a relay pole to cut out and protect the tripping coil.

Modular construction is used. Poles and latch units are individually removable and replaceable. Access for wiring, inspection, removal of poles or latch unit, is from the front. Because of solid side walls, no extra clearance is required between adjacent relays. The construction provides a solid shelf along the relay top for flat or bundled wiring. Only ⅞-in. clearance is required below the relay magnet for coil change. Latch relays with up to six poles are available without double-decking. Clark Controller Co.

48—JET CLEANER takes on heavy-duty jobs

Model CS 628 is a combination steam and hydraulic jet cleaning unit—the product of Clayton Mfg. Co. and Sellers Injector Corp.—designed especially for heavy duty industrial cleaning and similar work. According to manufacturers, its design makes it adaptable for use wherever steam or

B.F.Goodrich

How Koroseal helps cut cost of nickel-plating jewelry

THE Victory Polishing and Plating Company of Providence, Rhode Island specializes in the nickel-plating of jewelry, turning out such items as nickel-plated cuff links, tie bars, necklace chains and pins. The nickel solution used is highly corrosive and runs at an almost constant 130°F. Ordinary "acid-resistant" hoses continued to fail—they couldn't take the combined assault of corrosion and heat.

Then, in the summer of 1956, the company installed B. F. Goodrich Koroseal rigid polyvinyl chloride pipe. Result: absolutely no maintenance is required, and close examination shows no apparent wear. This company is replacing all of its "acid-resistant" hose with Koroseal pipe, and has lined all its acid storage tanks with rigid Koroseal PVC plate.

Versatile Koroseal has answered countless problems for alert manufacturers. Koroseal is unaffected by most alkalies and acids, and is completely inert in the presence of oil, alcohol, and salt solutions.

Exceptionally easy to install, Koroseal PVC can be threaded, cut, welded or drilled. It has excellent insulation properties, will not support combustion, and never needs painting.

Find out how this light, inexpensive, long-wearing pipe can make your operations more efficient. Fill in and mail the coupon on the right. *B. F. Goodrich Industrial Products Company, Marietta, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS CO.
MARIETTA, OHIO

B.F.Goodrich Industrial Products Co.
Dept. PE-3, Marietta, Ohio.

Please send me free booklets on:
- ☐ Rigid Koroseal Pipe
- ☐ Rigid Koroseal Sheet

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Company_____

Address_____

City_____ Zone____ State_____

Koroseal —T.M. Reg. U.S. Pat. Off.

For more facts circle 623 on Reply Card

NEW! EXCLUSIVE!

MOST POWERFUL
700w, 400w, 250w. REFLECTOR
MERCURY LAMPS

Easily Installed

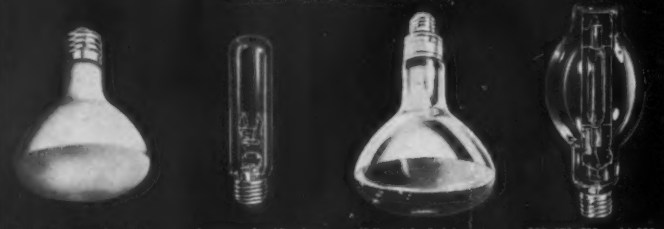
Nickel-plated brass base won't corrode or freeze in socket. Extra clamp assures support for R80.
Weatherproof hard glass. No heavy, enclosed fixture needed. Low-cost installation.
Sealed-in reflector stays bright without cleaning throughout lamp life.

RADIANT

R60 and R80 MERCO-SPOT, MERCO-FLOOD, and MERCO-WHITE Lamps for high, medium, and low bay and outdoor lighting.

MORE LIGHT · LESS POWER · LET US PROVE IT

SEND for BULLETIN 27



R-type incandescent lamps. 150 to 1,500w.
Spatterproof welding lamps. 50 to 150w.
Hi-Heat Infra-Red Lamps. 250 to 500w.
250, 400, 700, and 1,000w mercury lamps.

RADIANT LAMP CORPORATION

300 Jelliff Avenue Newark 8, N. J.

Manufacturers of Lamps from 50 to 10,000 watts for PROJECTION • SPOTLIGHT • FLOODLIGHT • INFRA-RED AERONAUTICAL • MOTION PICTURE PRODUCTION • MERCURY VAPOR • GENERAL SERVICE

For more facts circle 624 on Reply Card

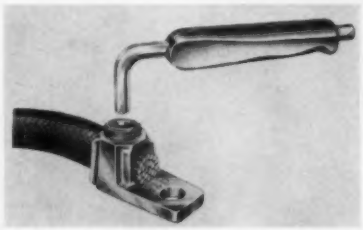
NEW PRODUCTS

(Begins on page 190)

hydraulic cleaning is needed. It provides either steam cleaning for high impact, heavy duty close up cleaning, or a hot hydraulic jet stream for cleaning distant surfaces, particularly those covered with caked mud, grease, ice. Used as a steam cleaner, it produces 280 gph at 90 to 100 psi, maximum volume and pressure usable at close range through a single nozzle. It can also be converted to a one- or two-gun operation at 140 gph per gun. As a hydraulic operated cleaner, the unit delivers 500 to 600 gph at 220 psi to 210 F. Clayton Mfg. Co.

49—CONE-SCREW LUGS for terminating copper cable

These extra wide range cone-screw lugs for terminating copper cable have a positive wire-stop and cone-screw for



faster and more secure installation. Lugs are available in six sizes to cover cable from No. 14 AWG to 500 MCM. The compact, one-piece terminals are made of high conductivity copper with corrosion-proof finish. Standard package of lugs contains a free hex socket installing wrench with plastic handle. The Thomas & Betts Co.

50—CERAMIC MATERIAL offers superior physical strength

Ultra low dielectric loss characteristics, and superior physical strength, even at high temperatures, are claimed for Type AD-99, a non-porous 99 per cent aluminum oxide ceramic. According to manufacturer, this material has the tensile strength of 34,000 psi, as strong as cast iron, and 30 per cent greater than many commercial high aluminas of 96 to 98 per cent aluminum oxide. It is reported particularly superior to most metals in strength at high temperatures, retaining 75 per cent of its tensile strength, 20,000 psi at 2000 F.

Type AD-99 is also announced as a superior dielectric material. At modern microwave frequencies, loss tangents are lower than those of plastics and a few special ceramic materials, it is stated. At room temperature, the loss tangent is given as 0.00006—0.00002 at

For more facts circle 625 on Reply Card →

we make

stainless steel valves

...nothing else

ALOYCO 111 Gate Valve for 150 lb. service features double disc ball-and-socket wedges. They are free to rotate and are non-fouling in any position which insures tight closure. There are Aloyco valves and alloys designed for every type of corrosive service.

SPECIALIZATION! Isn't it reasonable to believe that the one company with experience, facilities, research and service all devoted to a single product is your best source of supply? The modern Aloyco foundry, for example, is designed to produce one end product only: pressure-tight Stainless Steel Valve castings of the finest quality.

ALLOY STEEL PRODUCTS COMPANY

LINDEN, NEW JERSEY

Longer Lasting

ALOYCO

VALVES

1ST IN CORROSIVE SERVICE

UNCONDITIONALLY GUARANTEED

AGAINST BREAKAGE

CROSBY-LAUGHLIN

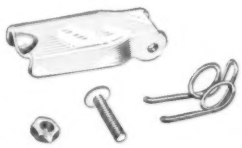
Load-Rated

TRADEMARK

HOOKS

In ¾ to 150 ton capacities

Now Crosby-Laughlin* offers you the highest guaranteed capacity *per size* in its "Load Rated" hook line. Choose from a complete selection of drop forged, heat treated hooks including eye, shank and swivel styles. Order these hooks the safe way—by capacity—in ¾ to 150 ton sizes. Every "Load Rated" hook has its safe working load stamped in the body for safety in selection—in use. Another feature: every Crosby-Laughlin hook (with drilled cam) can be converted to a safety hook at anytime. Stainless steel latch mechanism (right) attaches quickly—keeps the load in place until released.



"Load Rated" hooks are forged from new alloys that increase capacities by 50% without increasing hook weight! Every "Load Rated" hook is unconditionally guaranteed against breakage throughout its life.

All Crosby-Laughlin "Load Rated" Fittings are now painted bright RED—demand the "red fittings" and be sure of quality—keyword of the world's most complete line of drop forged fittings for wire rope and chain that includes Crosby "Red U-Bolt" Clips, wire rope blocks, shackles, "Missing Links",* grabhooks and turnbuckles!

*TRADEMARK

FREE NEW CATALOG

More than 2000 items—detailed specifications . . . dimensional data are included in this catalog that lets you order fittings the safe way—by capacity!

This free catalog is available now at construction and industrial equipment distributors and mill supply houses. Or write direct.

INDUSTRIAL DISTRIBUTORS SERVING INDUSTRY ECONOMICALLY THE RIGHT HAND OF PRODUCTION

Stocked and sold by leading distributors everywhere

CROSBY-LAUGHLIN *Division*

American Hoist and Derrick Company

FT. WAYNE 1, INDIANA

For more facts circle 626 on Reply Card

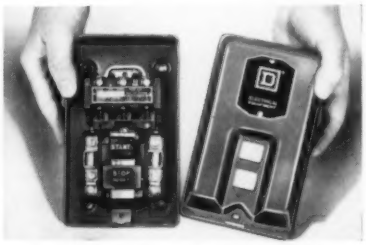
NEW PRODUCTS

(Begins on page 190)

100 mc, less than 0.0001 at 300 mc, and 0.00052 at 50 Kmc. These properties, combined with excellent hardness and wear resistance of the alumina family, are said to make Type AD-99 a superior ceramic for commercial use. In addition, it is said to offer complete homogenity, achieved through use of isostatic process. Coors Porcelain Co.

51—MANUAL STARTERS for motors to 7½ hp

Class 2510 integral horsepower manual starters, in NEMA Size 0 and 1, are for control of motors up to 7½ hp. They feature a heavy-duty, toggle action operating mechanism designed for positive snap-action opening and closing of the contacts, with no dead center

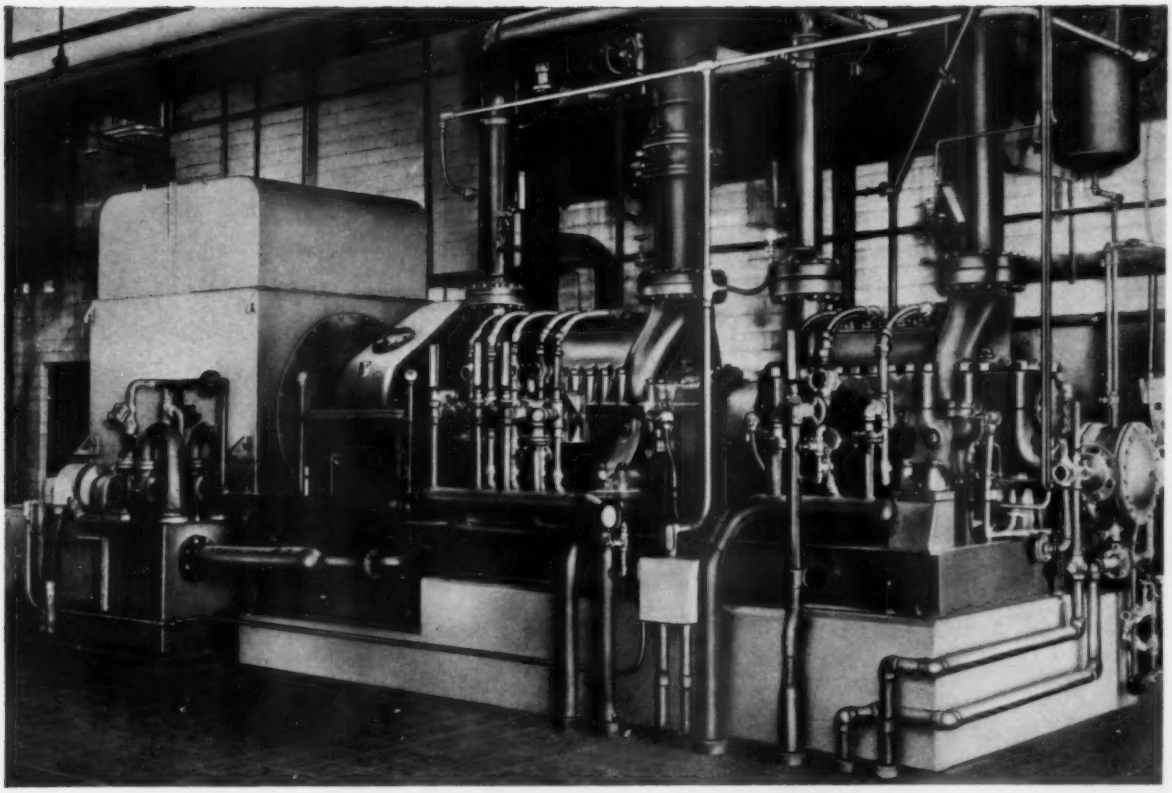


position. Melting alloy type relays of unit construction serve to provide trip-free overload protection. Self-centering pushbuttons give visual indication of an overload condition. Rated up to 600 v a-c or 250 v d-c, these starters are available in compact, two-, three- or four-pole construction. In addition to an open-type version, enclosed models are offered. To simplify installation, pressure wire connectors are provided on wiring terminals. Packaged parts kits are available for routine maintenance. Square D Co.

52—IODINE GERMICIDE has wide-range activity

Hi-Sine is a detergent-germicide containing iodine complexes. It is claimed to have wide-range activity and to rapidly kill tubercle bacilli and polio viruses as well as other pathogenic bacteria. For added safety, Hi-Sine has a built-in signal, reportedly reliable regardless of water hardness or temperature. This signal is a visual indicator that works as follows: Hi-Sine, when freshly diluted, has a rich amber color. As it is consumed through use, the color fades. When the amber color is present, Hi-Sine is being used safely, says manufacturer; when the color fades, a fresh solution must be prepared.

Hi-Sine is announced as safe on all



Two Clark centrifugal compressors, an 8-stage No. 1 and a 10-stage No. 2, diaphragm cooled, with tandem drive at Public Service Electric and Gas Company's new Linden Generating Station.

Clark–first with Centrifugals for

SOOT BLOWING

Clark is the first builder of centrifugal compressors to build them specifically for soot blowing. The latest installation, at the Public Service Electric and Gas Company, Linden Generating Station, New Jersey, consists of one 8-stage No. 1 and one 10-stage No. 2 horizontally-split centrifugal compressors furnishing air for soot blowing, service, and instrument air requirements. They are diaphragm cooled compressors driven in tandem by a 3,000 bhp. electric motor.

Double-wall cooled diaphragms provide the simplest, safest, and most effective way to cool a multi-stage centrifugal compressor. Clark diaphragm cooling permits a greater pressure rise in a single case, using less horsepower than uncooled designs. It also assures accurate temperature control.

Horizontally-split Clark units, with shaft extensions, permit tandem drive of five or more units from one driver. This means a substantial saving in space, more economic piping arrangement, and less maintenance. Installation and operating costs are reduced.

Clark builds a complete line of multi-stage centrifugal compressors and in many instances a gas turbine to drive them. The precision and efficiency built into Clark centrifugals are supported by an encyclopedia of experience. For all the facts on these field-proved, unit-engineered machines, call in your nearest Clark representative or write today for copy of Bulletin 150.

CLARK BROS. CO., OLEAN, NEW YORK

One of the Dresser Industries

Sales and Service Outlets in Principal Cities Throughout the World

CLARK®

CENTRIFUGAL COMPRESSORS • GAS TURBINES

For more facts circle 627 on Reply Card

inspection...

is this your wire rope problem?

Safety and economy can be greatly improved by methods described in LESCHEN RED-STRAND BULLETIN NO. 104

Without adequate inspection, a severely damaged rope might remain in service until sudden failure and thus bring disaster. Such danger will be foreseen and adequate safety measures adopted in plenty of time, however, wherever a well organized program of periodical inspections is maintained. Bulletin No. 104 gives detailed instructions for setting up and maintaining such a program, tells what to look for and what findings mean. Copies sent free on request. Write to H. K. Porter Company, Inc., Leschen Wire Rope Division, St. Louis 12, Mo.

LESCHEN Red-Strand WIRE ROPE

H. K. PORTER COMPANY, INC.

LESCHEN WIRE ROPE DIVISION

For more facts circle 628 on Reply Card

NEW PRODUCTS

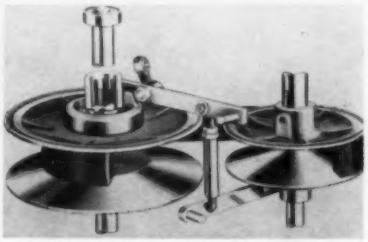
(Begins on page 190)

flooring surfaces. It is suggested for cleaning and disinfecting floors, walls, utensils, equipment, receptacles, lavatories and even conductive flooring. Available in gallon containers, it is extremely concentrated. Stock solution is made by mixing a gallon of Hi-Sine with a gallon of water. A use solution is made by using 1 oz of this stock solution with 1 gal of water. Hi-Sine is claimed non-toxic to human beings. Huntington Laboratories, Inc.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

53—V-S DRIVES in two basic constructions

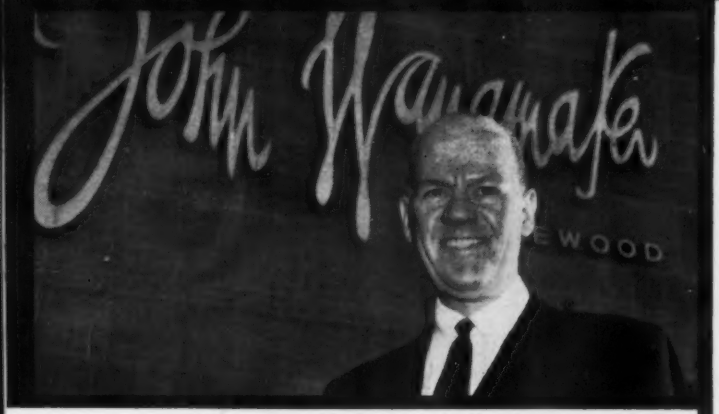
Design W Speed-Trols, similar to company's Design F, accomplish speed variation by means of a ribbed V belt and dual variable pitch pulleys on



parallel shafts. Movement of the pulleys is synchronized by company's "positive pulley control" which can be adapted to manual, semi-automatic or automatic controls. The units come in two basic constructions: integral motor construction, with motor mounted as an integral part of the case; and separate motor construction with motor on a separate platform and directly coupled to the variable speed transmission. Sterling Electric Motors, Inc.

54—LIFT TRUCK SYSTEM has a hand lift jack

The Roll-N-Stor is a non-powered lift truck with a hand lift jack for use with any number of semi-live skid platforms. System consists of a lift jack with a pintle that engages a special bracket under front of skid. A forward pull of jack handle raises the legs of the skid off the floor and the unit is ready to roll. When empty, skids can be stored on end in a small area. Designed for rugged service,



Mr. Sydney H. Silk, Operating Manager of John Wanamaker's Wynnewood, Pennsylvania, store, says: "Scott worked with our own planning staff while our washrooms were still in the designing stages. These rooms have proved to be very satisfactory for our needs—and our employees like them!"

This washroom incorporates many of the sound principles of Scott's Washroom Advisory Service: recessed wall receptacles, off-the-floor equipment, recessed lighting, easy-to-maintain tile walls and floor, proper traffic flow from washbowls to towels to exit doors. Such efficient facilities will, over the coming years, pay for themselves!

Female employees enjoy a well-planned combination lounge-locker-washroom—and this one serves about 150 people without crowding. Wanamaker had several excellent reasons for calling on Scott: (1) the firm uses Scott products in all stores, (2) knew that Scott has serviced over half-a-million washrooms, (3) is always concerned with employee comfort and happiness, and felt that Scott had the answers.

another case of modern, cheerful, efficient washrooms . . . with the help of Scott's Washroom Advisory Service!

There's no charge or obligation when you call on Scott's Washroom Advisory Service. Find out about it. Get Scott's free booklet on the subject of washrooms . . . complete with illustrations, diagrams, ideas. Mail the coupon today!

SEE SCOTT'S 14-MINUTE FILM
ON WASHROOM PLANNING!
(It offers many "quick change" ideas too—to save you money, boost efficiency now!)

Scott Paper Company
Department PE-83
Chester, Pennsylvania

☐ Please rush me the free booklet on Scott's Washroom Advisory Service

☐ Please let me know how to see the Scott film

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

SCOTT PAPER WASHROOM ADVISORY SERVICE®

See "Father Knows Best" and "The Gisele MacKenzie Show" on NBC-TV!

For information on Scott recessed cabinets, write: D. J. Alexander Corporation, 2944 East Venango Street, Philadelphia 34, Pa.

For more facts circle 629 on Reply Card

are these the

"TROUBLE SPOTS"

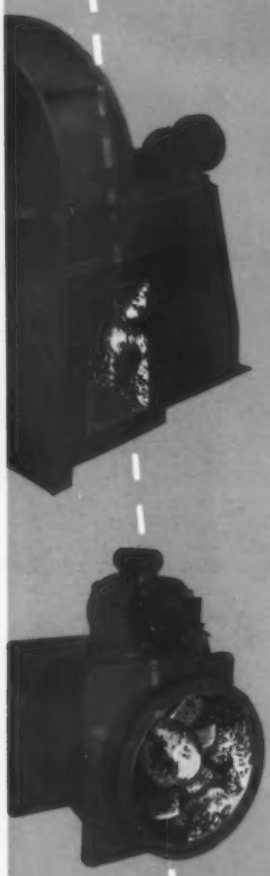
IN YOUR EXHAUST SYSTEM?

SOLVE YOUR CORROSION PROBLEMS

with

INDUSTRIAL PLASTIC FABRICATORS'

P.V.C. Blowers and Fans



If your company is engaged in pickling, plating, anodizing, etching, bleaching and chemical processing operations, IPF PVC centrifugal blowers and tube-axial fans can stop corrosion in your exhaust system.

Have you ever figured the corrosion losses of your present exhaust system? With conventional type blowers and fans, you don't buy corrosion but you never stop paying for it in repeated paintings and protective coatings, replacement costs, lost production time and interruption of critical processes.

You can prevent such losses with IPF PVC blowers and fans. They outlast conventional types of fans three to five times . . . resist most corrosive fumes and combination of fumes . . . are lightweight, smooth, non-porous, plastic and never require repainting or recoating.

Descriptive literature on the complete line of IPF PVC fans, tanks, hoods, ducts and stacks is available on request.

ipf

MANUFACTURED BY

industrial plastic fabricators, inc.

NORWOOD, MASS. NOrwood 7-3411

REPRESENTATIVES THROUGHOUT THE UNITED STATES

For more facts circle 630 on Reply Card

NEW PRODUCTS

(Begins on page 190)

the lift truck system is of heavy duty construction with three oak rails running the length of platform to prevent sagging under load. Platforms are oak hardwood and come in a wide range of sizes, with built-up superstructure, if desired. Wheels are of semi-steel, rubber or molded plastic. The Hamilton Caster & Mfg. Co.

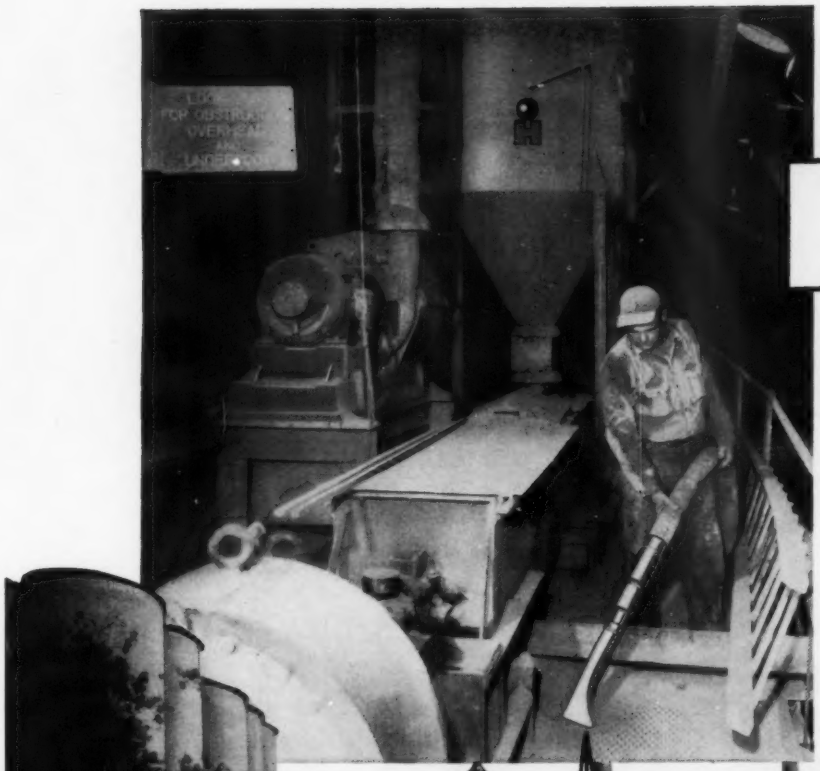
55—AIR IMPACT WRENCH is lighter, more powerful

Although more compact and lighter, the Model 024 is announced as a more powerful ½-in. drive air impact wrench. Its simplified impact mechanism has only four moving parts, no

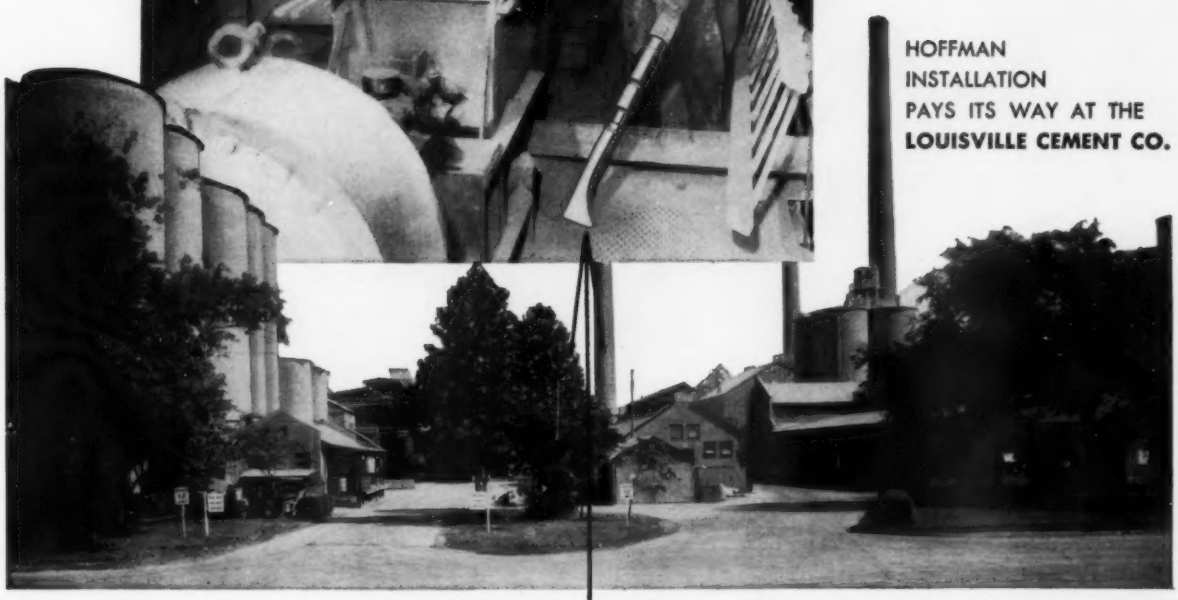
springs or gears, and unitized construction for easy inspection removal, manufacturer announces, and the needle bearing design for impact spindle rotation, provides longer service and less maintenance. The wrench weighs only 6-⅜ lb, is 6-9/16 in. long. it is pointed out, but the combination of an extra-large air motor with 6000 rpm free speed and compact mechanism make the tool harder hitting and faster driving with shorter work cycles. The Model 024 is designed for ⅜-in. bolt size capacity work. Features include ½-in. square drive, and pistol-grip handle with pushbutton reversing switch. Thor Power Tool Co.

56—TRANSFORMER is quieter, lighter, and smaller

Type EP is described as a dry-type specialty transformer that is quieter, lighter, and smaller than company's previous designs. The units are reported particularly suited for application to electrical machinery, panelboard, and other general installations. Core and coils are encapsulated in resin with filler, to provide a sealed unit that can be used in hazardous areas. Sealing the units in resin results in sound levels averaging 5 db below NEMA standards, it is stated,



HOW A U.S.HOFFMAN STATIONARY VACUUM CLEANING SYSTEM CONQUERED COSTLY CEMENT DUST PROBLEMS



HOFFMAN INSTALLATION PAYS ITS WAY AT THE **LOUISVILLE CEMENT CO.**

before

a U.S.Hoffman stationary vacuum cleaning system was put into operation at the Louisville Cement Co., plant in Speed, Indiana, these were among their cement dust problems:

1—Considerable spillage occurred in loading with little or no salvage.

2—Three to four men were required to clean up hopper cars after a day's loading.

3—Broom sweeping wasted usable cement and created a health and safety hazard.

4—Efficiency was impaired by poor housekeeping resulting from dust ridden plant area and RR sidings.

5—Manual removal of cement from overloaded hopper cars and trucks caused costly delays.

Hoffman INDUSTRIAL VACUUM SYSTEMS

after

the installation of the U. S. Hoffman stationary vacuum system efficiency was increased 100% and these material, time, and labor savings took place:

1—Cement previously lost in spillage was reclaimed as a saleable product.

2—One man and a U.S.Hoffman stationary vacuum system handled the entire cleaning job.

3—End to broom sweeping eliminated health and safety hazard, saved cement.

4—Improved housekeeping at RR sidings and in plant area increased efficiency and production.

5—Savings resulting from speedy vacuum system removal of excess cement alone more than paid for the installation within a year.

Custom Designed For Your Needs

U.S.Hoffman air appliance engineers will be glad to make a survey of vacuum cleaning possibilities in your plant. No obligation of course. Write for Catalog AB-100.

AIR APPLIANCE DIVISION U.S.HOFFMAN MACHINERY CORPORATION 103 FOURTH AVENUE, NEW YORK 3, N. Y.

Other industrial equipment — **PNEUMATIC CONVEYING DIVISION** — Custom Built Systems — **INDUSTRIAL FILTRATION DIVISION,** Machine Tool Coolant Clarifiers — Solvent Recovery Systems — Oil Conditioners.

For more facts circle 631 on Reply Card

Low-cost ½-TON lift...3-tool usefulness

If you still think of fork lifts in terms of $3000 to $4000 or more per unit, you're in for a pleasant surprise! *For much less,* Kwik-Mix Moto-Bug puts labor-saving fork lift service within economical reach of small plants — and has unlimited usefulness as an auxiliary low-cost material-handling tool for heavy industry. You get 6-foot lifting height and 1000-lb. capacity, (at 15-inch load center) with S-10 Moto-Bug. It has adjustable forks 6 to 32 inches wide, full power forward and reverse, short 61-inch turn radius — tilting mast optional. S-10 weighs 1655 lbs. — works on light ramps and over old warehouse floors where heavier lift trucks can't safely travel. For diversified material handling, fork lift is interchangeable with ¾-ton hopper body, flatbed platform. Want more facts? See your Kwik-Mix distributor or send coupon.

Switch S-10 Moto-Bug from fork lift to 10 or 15-cu. ft., gravity-dump hopper and you have a big capacity power wheelbarrow that carries up to 1500 pounds of any bulk material.

Change from hopper body to 32-inch x 4-foot flatbed, and you have a heavy-duty, ¾-ton truck with tilting platform. Larger-capacity R-18 Moto-Bug with multiple attachments is also available. Exhaust fume-control unit, or L. P. gas equipment is optional on the R-18 or S-10.

KWIK-MIX Company, Port Washington, Wis.
SEND US DETAILS ON: ☐ *S-10* ☐ *R-18 Moto-Bug*

NAME_____
TITLE_____
COMPANY_____
DIVISION_____
STREET_____
CITY, STATE_____

PE KM805

KWIK-MIX® MOTO-BUG® Division of Koehring Co.

For more facts circle 632 on Reply Card

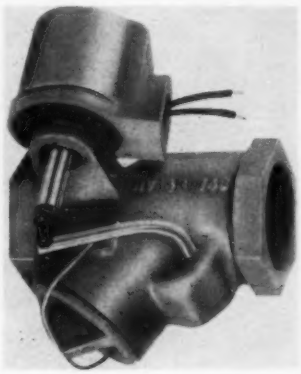
NEW PRODUCTS

(Begins on page 190)

and at the same time, excellent heat transfer properties of the resin and filler have made possible units averaging 55 per cent smaller and 14 per cent lighter. The transformers come in ratings from ¼ to 10 kva, 600 v and below, and can be mounted in any position on wall, floor or ceiling. Units rated 3 to 10 kva are reported suitable for outdoor use. To simplify installation, a large capacity wiring compartment is available. Westinghouse Electric Corp.

57—DRAIN VALVE is solenoid operated control

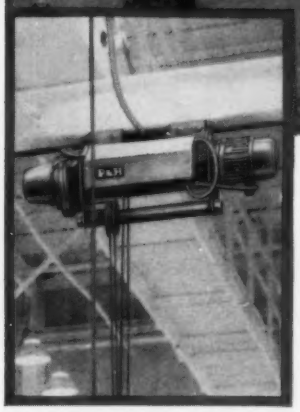
The Bulletin 8339 was originally designed for use in industrial and commercial laundries where dumping of waste from washing machines is automatically controlled. However, it may be used wherever controlled draining or dumping of liquids is required. It



is a direct acting type solenoid controlled valve having excellent draining characteristics. The absence of cavities or obstructions in valve itself eliminates collection of foreign matter, it is pointed out. A quick clean out plug, easily accessible, not only eliminates messy maintenance, company says, but promotes clean drainage. Valve has all iron construction, and stainless steel seat, including a watertight solenoid enclosure. Available in 1½ and 2 in. sizes. Bulletin 8339 gives details. Automatic Switch Co.

58—MERCURY SWITCH resists shock, chemical splash

Because it is unaffected by water or vapor and resistant to oil, alkalis and acids, this nylon-enclosed mercury switch is well suited for applications where chemical splash is a factor, manufacturer states. The switch, 7 MPI-2, consists of a glass tube mercury switch embedded in a synthetic



P&H Hevi-Lift Hoists speed assembly of first Douglas DC-8 Jet Transport

It takes precision control of lifting and lowering to position the heavy DC-8 fuselage for joining to the wings. Douglas gets it by using two P&H Hevi-Lift® Hoists.

You can't beat a Hevi-Lift, when it comes to fast response for precise inching and spotting. The RCD brake—found only on a Hevi-Lift—is the reason why.

It's a mill-type brake like those used on big overhead cranes. It has no linkage, no laminations, and only one simple point of adjustment. Total brake movement is only 1/32 of an inch.

There are other advantages in using Hevi-Lifts (capacities 1,000 to 40,000 lbs.) — maintenance costs that are as much as 50% lower than usual, for example. Write for Bulletin H-5 to Dept. 202C, Harnischfeger Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H ... quality and service for 74 years

For more facts circle 633 on Reply Card

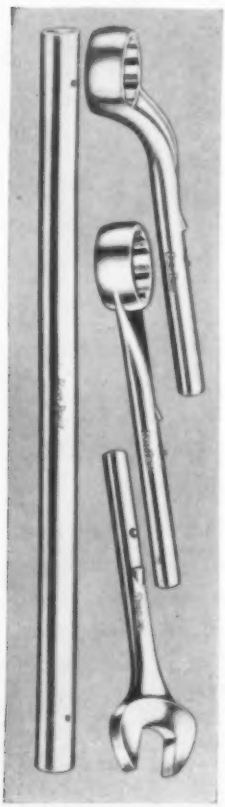
TOOLS WITH MUSCLE

to service industrial equipment

*Snap-on Blue-Point **Heavy-Duty**

BOXOCKET® Open End WRENCHES

5 sizes — 15", ▼ 18", 24", 30", 36"



◀ 22 sizes — 1 1/16" to 3 1/8"

◀ 21 sizes — 15/16" to 3 1/8"

◀ 9 sizes — 7/8" to 1 1/2"

Here are the husky, powerful wrenches repairmen need on many industrial repair jobs. They're safe, dependable, the kind mechanics can really "lay into." And they're available in quickly changeable combinations of Open End Wrenches and straight or offset Boxocket® models.

The tightest nuts and bolts turn easily under powerful leverage. Their trim build and long reach get these tools into location quickly and easily. When free swing is restricted, double hexagon broaching allows a short turning arc. Extension handles lock securely, can't be separated accidentally — a safety factor you and your men will appreciate.

Yes sir, it's tools like *Snap-on* heavy-duty wrenches that help cut downtime — put machinery back into action. *Snap-on* provides specialized hand tool service through 54 branch offices. Call your branch or write us for catalog.

SNAP-ON TOOLS CORPORATION

8068-C 28th Avenue • Kenosha, Wisconsin

For more facts circle 634 on Reply Card

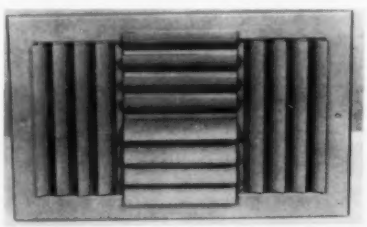
NEW PRODUCTS

(Begins on page 190)

rubber compound and enclosed inside a nylon can. The resilient embedment material lessens effect of vibration and provides insulation and seal for the lead entrance. Small operating force and ability to repeat operation at the same angle of tilt contribute to performance. There is no space inside the enclosure where moisture can collect, it is pointed out, and dependable switching is offered from -35 to 200 F. Contact arrangement is single-pole single-throw. Switch position, as mounted, determines whether circuit is to be normally open or normally closed. Rating is 3 amp, 115 v d-c, resistive load. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

59—AIR REGISTERS provide four-way air flow

This line of grilles and registers features adjustable curved louvres of extruded aluminum. The louvres can be arranged to provide four-way flow of air from one register. The complete



line includes grilles and registers for one-way flow either horizontal or vertical, simultaneous two-way flow horizontal or vertical, three-way flow, horizontal to the right and left and either up or down from the center group of louvres. In addition, straight adjustable extruded aluminum louvres can be furnished mounted behind curved louvres to increase air flow control. Waterloo Register Co., Inc.

Use the Reader Service Cards provided on pages 251-252 to ask for more information on these products. Circle item numbers of products in which you are interested.

60—ROTARY PUMP for viscous and thin liquids

This positive displacement pump designed for high efficiency in the capacity range to 1200 gpm is available for general transfer, metering and other services involving pressures to

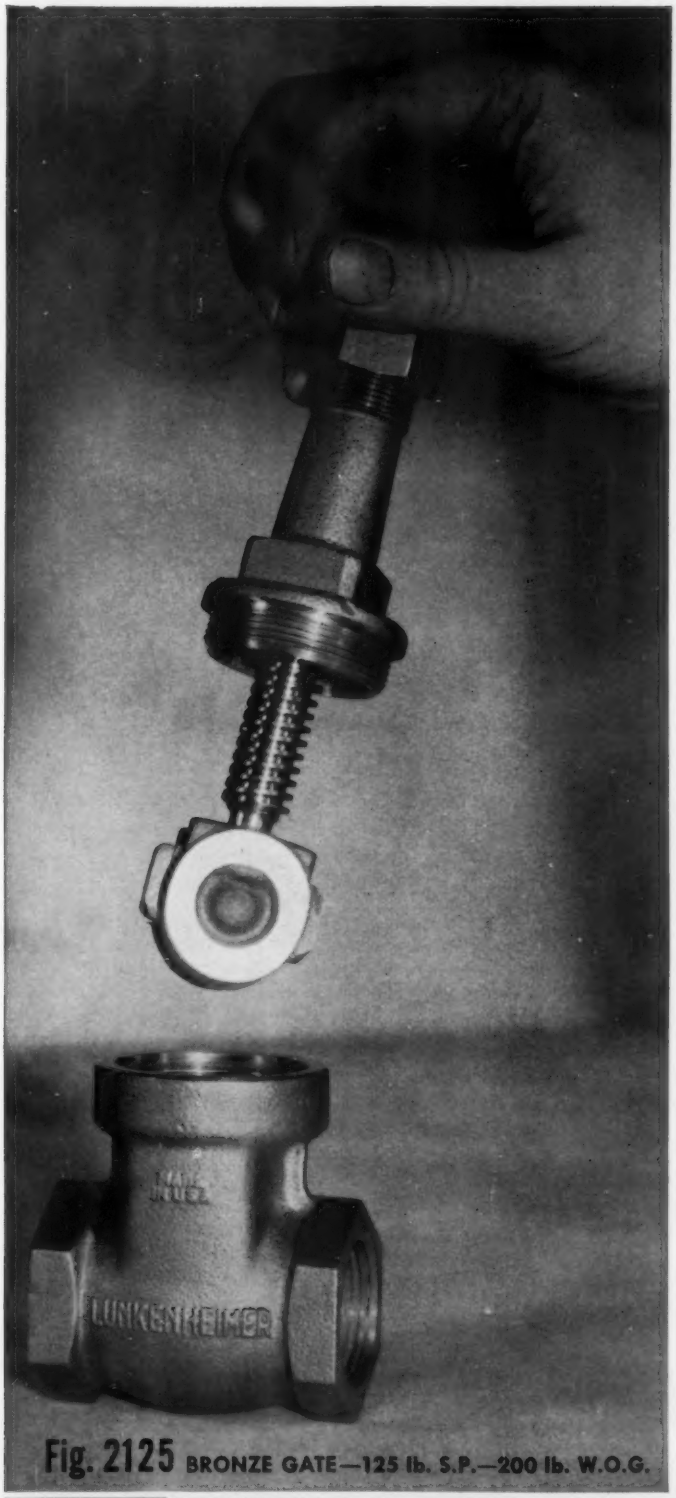


Fig. 2125 BRONZE GATE—125 lb. S.P.—200 lb. W.O.G.

SEE WHY LUNKENHEIMER BRONZE GATE VALVES CUT MAINTENANCE

What you pay to maintain a valve can exceed its original cost many times over. That's why it pays to examine the maintenance-saving features of Lunkenheimer Bronze Gate Valves.

Stems are made of Stemalloy®, an exclusive Lunkenheimer alloy that assures longer stem thread life. Integral seats are precision tapered to insure perfect seating. Discs are compounded for long, wear-resistant service, machined to a high finish for smooth, trouble-free operation.

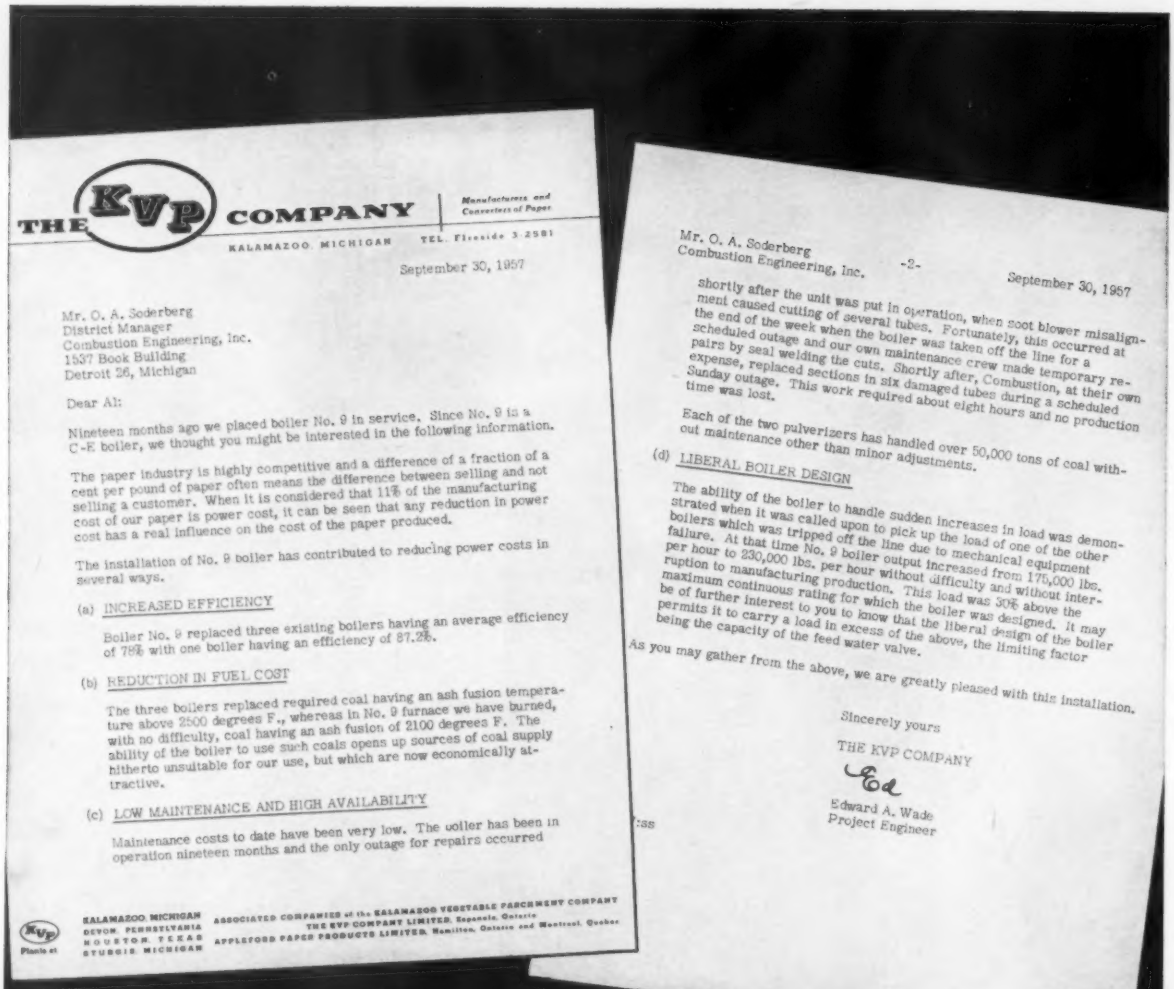
Let your Lunkenheimer Distributor show you the maintenance-saving features of Lunkenheimer Bronze Gate Valves and why you can't find the cost of a valve on a price list... Or write The Lunkenheimer Co., Cincinnati 14, Ohio.

LUNKENHEIMER QUALITY

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

For more facts circle 635 on Reply Card



THE KVP COMPANY

Manufacturers and Converters of Paper

KALAMAZOO, MICHIGAN TEL. Fireside 3-2581

September 30, 1957

Mr. O. A. Soderberg
District Manager
Combustion Engineering, Inc.
1537 Book Building
Detroit 26, Michigan

Dear Al:

Nineteen months ago we placed boiler No. 9 in service. Since No. 9 is a C-E boiler, we thought you might be interested in the following information.

The paper industry is highly competitive and a difference of a fraction of a cent per pound of paper often means the difference between selling and not selling a customer. When it is considered that 11% of the manufacturing cost of our paper is power cost, it can be seen that any reduction in power cost has a real influence on the cost of the paper produced.

The installation of No. 9 boiler has contributed to reducing power costs in several ways.

(a) INCREASED EFFICIENCY

Boiler No. 9 replaced three existing boilers having an average efficiency of 78% with one boiler having an efficiency of 87.2%.

(b) REDUCTION IN FUEL COST

The three boilers replaced required coal having an ash fusion temperature above 2500 degrees F., whereas in No. 9 furnace we have burned, with no difficulty, coal having an ash fusion of 2100 degrees F. The ability of the boiler to use such coals opens up sources of coal supply hitherto unsuitable for our use, but which are now economically attractive.

(c) LOW MAINTENANCE AND HIGH AVAILABILITY

Maintenance costs to date have been very low. The boiler has been in operation nineteen months and the only outage for repairs occurred

KALAMAZOO, MICHIGAN
DEVON, PENNSYLVANIA
HOUSTON, TEXAS
STURGIS, MICHIGAN
Plants at

ASSOCIATED COMPANIES of the KALAMAZOO VEGETABLE PARCHMENT COMPANY
THE KVP COMPANY LIMITED, Espanola, Ontario
APPLEFORD PAPER PRODUCTS LIMITED, Hamilton, Ontario and Montreal, Quebec

Mr. O. A. Soderberg
Combustion Engineering, Inc. -2- September 30, 1957

shortly after the unit was put in operation, when soot blower misalignment caused cutting of several tubes. Fortunately, this occurred at the end of the week when the boiler was taken off the line for a scheduled outage and our own maintenance crew made temporary repairs by seal welding the cuts. Shortly after, Combustion, at their own expense, replaced sections in six damaged tubes during a scheduled Sunday outage. This work required about eight hours and no production time was lost.

Each of the two pulverizers has handled over 50,000 tons of coal without maintenance other than minor adjustments.

(d) LIBERAL BOILER DESIGN

The ability of the boiler to handle sudden increases in load was demonstrated when it was called upon to pick up the load of one of the other boilers which was tripped off the line due to mechanical equipment failure. At that time No. 9 boiler output increased from 175,000 lbs. per hour to 230,000 lbs. per hour without difficulty and without interruption to manufacturing production. This load was 30% above the maximum continuous rating for which the boiler was designed. It may be of further interest to you to know that the liberal design of the boiler permits it to carry a load in excess of the above, the limiting factor being the capacity of the feed water valve.

As you may gather from the above, we are greatly pleased with this installation.

Sincerely yours

THE KVP COMPANY

Edward A. Wade
Project Engineer

:ss

You'll want to read this letter...

. . . if you're going to be in the market for boilers in '58!

C-E offers a type and size of boiler for every steam requirement — from 4,000 to 4,000,000 pounds per hour — and recently was awarded a contract for a boiler in the latter size class which will be the biggest boiler ever built.

COMBUSTION ENGINEERING

Combustion Engineering Bldg., 200 Madison Ave., New York 16, N. Y.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE.

For more facts circle 636 on Reply Card

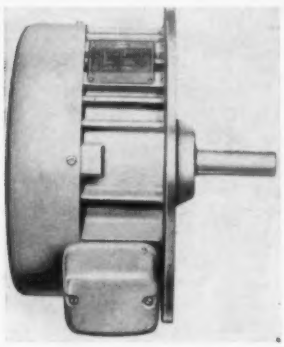
NEW PRODUCTS

(Begins on page 190)

100 psi. Minimum sealing surfaces with optimum rotor and idler dimensions for any given viscosity reduce viscous drag with resultant efficiencies as high as 90 per cent, says manufacturer. Direction of flow may be reversed regardless of shaft rotation. Units are available in materials for handling a variety of liquids. Seren Machine Products Corp.

61—SHALLOW MOTOR has less length than standard ones

Length reductions up to 60 per cent over standard motors of the same rating are claimed for the Pancake Motor. It is designed for use on machine tools, roof-ventilating fans and other space-

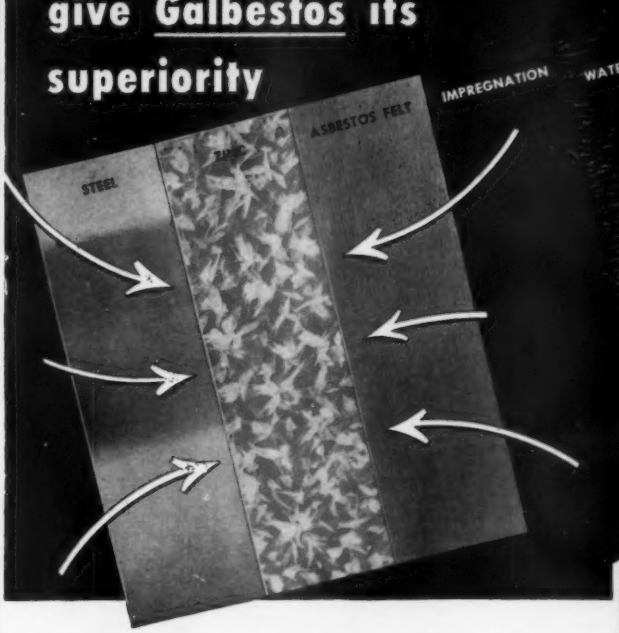


cramped applications. The Pancake Motor is a flange type unit of conventional radial air-gap design; it achieves its shorter length through formed end coils and a one-piece housing-bearing bracket. For normal operating conditions it is built in an open drip-proof enclosure, but enclosed construction can be furnished for use where dirt, filings, corrosive chemicals, coolants are present. It is available in ratings from 1 to 15 hp at 1800, 1200 and 900 rpm. Features include vertical or horizontal mounting, quiet operation. Bulletin 2100 gives details. The Louis Allis Co.

62—MECHANICAL LIFTER handles 1000-lb loads

This crank up, crank down 1000-lb capacity mechanical lifter, priced under $200, has been designed for low cost handling of light and medium-weight materials. The Half-Tonner features as standard equipment a positive-acting safety device. The one-piece all-steel welded lifter offers vertical lift of 69 in. from floor level, lowered height of 4½ in. and over-all height of 79¾ in. Platform is 24 in. sq. Over-all working depth is 38 in., storage depth 34 in. Cable winch is designed to reduce

How molten metal helps give Galbestos its superiority



Robertson Color Galbestos has the greatest resistance to weather and corrosion of any protected steel roofing or siding obtainable anywhere. This position of broad superiority is made possible by a unique manufacturing process exclusive with H. H. Robertson Company.

First, the steel sheet is pickled . . . then given a coating of molten zinc. Asbestos felt is then pressed on so that as the molten metal hardens in cooling it grips the felt fibers in absolute bond. The asbestos is then impregnated with a special asphaltic compound and, finally, given a tough weatherproof coating. Galbestos can be furnished flat or in the 3 well-known corrugations: Standard, Mansard, and V-Beam. The resultant material is so durable, it may be sheared, bent, rolled, crimped and riveted in the field as easily as ordinary unprotected steel. It will withstand the greatest possible extremes in weather temperatures without deterioration, and will actually retard fire better than naked steel. For an industrial roofing or siding that requires no maintenance under the most severe corrosive conditions, specify Color Galbestos.

Long Service Life. Color Galbestos will give longer maintenance-free service under the most severe weather and man-made corrosive conditions. Even salt air cannot penetrate its tough coatings to destroy the steel core.

Not Fragile. Color Galbestos' strong steel core sheet guarantees against breakage—during shipment or during erection.

Resists Climatic Extremes. Color Galbestos is not subject to damage either by tropic or frigid temperatures. Its coatings will not run under broiling sun or crack or spall in sub-zero weather.

Goes Up Fast. The exclusive Robertson Top-Speed method of attaching Color Galbestos to structural steel speeds up erection for quicker occupancy.

Resists Flame. Leading testing laboratories have made exhaustive tests on the fire resistance of Galbestos and have published the results. Copies of these reports are available for study.

NOW AVAILABLE IN SIX USEFUL COLORS FOR ROOFS AND SIDEWALLS

Robertson Color Galbestos

a product of **H. H. Robertson Company**
2419 Farmers Bank Building • Pittsburgh 22, Pa.
In Canada: Robertson-Irwin Ltd., Hamilton, Ontario
In England: Robertson Thain Ltd., Ellesmere Port, Cheshire

For more facts circle 637 on Reply Card→

bright for life

thanks to **CHAMPION LIGHTMANSHIP**

MILLIONS OF LAMPS A YEAR . . .
ONE PLANT standard of quality control

With all manufacturing concentrated in the big, modern plant shown above, every Champion lamp is subjected to a single, high standard of quality control.

Uniform control like this is one more example of how Champion applies Lightmanship to make sure you always get all the light you pay for in Champion lamps.

CHAMPION LAMP WORKS
Lynn, Massachusetts
A division of Consolidated Electric Lamp Co.

CHAMPION Lamps
Incandescent Fluorescent
Your best buy in lamps

For more facts circle 638 on Reply Card

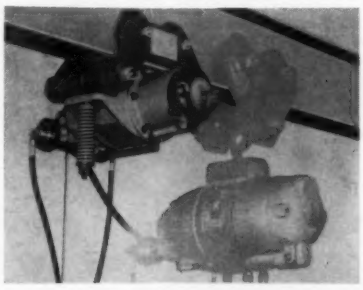
NEW PRODUCTS

(Begins on page 190)

handle effort to only 27 lb at full load. Lifting speed is 1½ in. per handle revolution. Special Products Div., The Colson Corp.

63—HOIST TROLLEY for loads up to 2 tons

One man can raise, lower or move loads up to 2 tons with positive control with the Hoistractor, it is announced. Powered by an axial-piston type air motor, this hoist trolley exerts 250-lb drawbar pull on a beam through a spring-loaded Neoprene drive wheel. It will pull a 2-ton load at 70 fpm, manufacturer states, and speed can be varied from creep to 150 fpm. Ac-



cording to company, the lightweight Hoistractor—connected to any beam hoist—moves heavy materials with greater speed and safety and without operator fatigue. It can also be used to power a traveling bridge crane.

A one-hand control for hoist and tractor is available in two types. The first is a pendent control with a squeeze-hand grip and operating levers. The other type, called a Stikontrol, is a swiveled rod with four-way grip control. Raising or lowering the grip raises or lowers the hoist; rotating the grip controls forward and backward motion. The Hoistractor fits most standard size beams, is adjustable to permit mounting on I-beams and can be adapted for other types of track. Gardner-Denver Co.

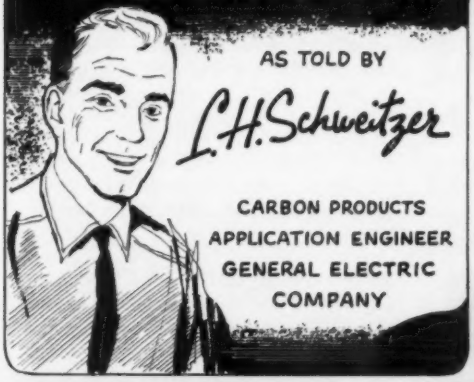
64—CHEMICAL PACKINGS color coded for service

Three styles of this color-coded mechanical packing for chemical service cover the full pH scale. For sealing strongest acids (pH 1 to 4) manufacturer offers Blu-Lon, a blue packing, in which each blue asbestos fiber is multicoated before and after braiding with a concentrate of Teflon. It has also undergone a heat controlled process to assure retention of Teflon and immunize it against harsh acids, it is noted. For sealing mild acids and mild alkalies (pH 5 to 7) Style 315,

"How G-E carbon brushes helped . . .

STOP METAL TRANSFER"

A GENERAL ELECTRIC CARBON BRUSH CASE HISTORY

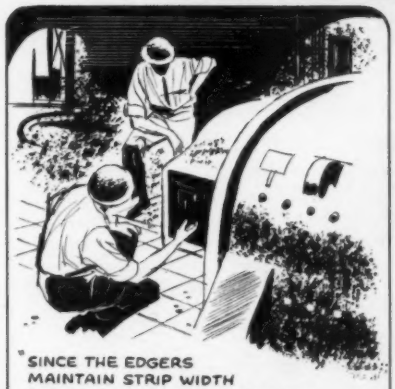


AS TOLD BY

L.H. Schweitzer

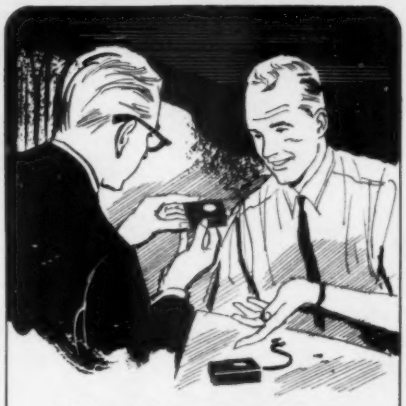
CARBON PRODUCTS APPLICATION ENGINEER GENERAL ELECTRIC COMPANY

1 "OUR CUSTOMER'S SKELP MILL WENT INTO OPERATION IN 1953 . . . ROLLING BILLETS INTO METAL STRIPS FROM WHICH SEAMLESS TUBES ARE MADE. BUT, IN 18 MONTHS, THE MILL'S D-C EDGER MOTORS DEVELOPED THREADED AND ROUGHENED COMMUTATORS."



2 "SINCE THE EDGERS MAINTAIN STRIP WIDTH DURING ROLLING, CONTINUOUS PERFORMANCE WAS IMPERATIVE. WHEN THE MILL OPENED, A HIGH LEVEL OF MAINTENANCE WAS INITIATED BY THE CUSTOMER, AND OUR OWN ENGINEERS WERE CLOSELY FOLLOWING OPERATION OF OUR NEW ELECTRICAL EQUIPMENT."

3 "AS SOON AS TROUBLE WAS SPOTTED, AN ANALYSIS WAS MADE OF ALL VARIABLES AFFECTING THESE UNITS. FINDINGS? THE BRUSHES WERE SUBJECTED TO A HIGHER PERCENTAGE OF LIGHT LOADS THAN WAS ANTICIPATED. THIS SET UP CONDITIONS CONDUCIVE TO EXCESSIVE METAL TRANSFER AND POOR FORMATION OF A STABLE FILM ON THE COMMUTATOR."



4 "ABSENCE OF A PROTECTIVE FILM HASTENED THREADING AND ROUGHENING. SO A SPECIALLY DESIGNED GENERAL ELECTRIC BRUSH WAS RECOMMENDED, WHICH ENCOURAGED FORMATION OF A STABLE FILM UNDER THESE LOADS, THUS PREVENTING EXCESSIVE TRANSFER."

5 "FAST FOLLOW-UP AND A COMPLETE LINE OF BRUSHES FOR EVERY NEED SOLVED OUR CUSTOMER'S PROBLEM WITH NO LOSS OF PRODUCTION! CHECKS OVER THE NEXT TWO YEARS SHOWED THREADING AND ROUGHENING ELIMINATED."

SPECIFY GENERAL ELECTRIC CARBON BRUSHES FROM THIS COMPLETE LINE TO HELP GET TOP PERFORMANCE FROM YOUR G-E MOTORS AND GENERATORS. FOR HELP WITH YOUR BRUSH PROBLEMS USE COUPON OR CONTACT YOUR G-E APPARATUS SALES OFFICE OR DISTRIBUTOR. GENERAL ELECTRIC CO., SCHENECTADY 5, N.Y.

New bulletin offers answers to brush application and performance problems by one of industry's top authorities.

GENERAL ELECTRIC CO.
Section E774-5 • Schenectady 5, N. Y.

☐ Please send GEA-6688, "Better Carbon Brush Performance"

☐ Also, send GEA-5597, "G-E Carbon Brushes for Motors and Generators"

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

GENERAL ELECTRIC

(Begins on page 190)

a black graphited braided asbestos packing is offered. For sealing strong caustics and other alkalies (pH 8 to 14) there is a white packing, White-Lon, which has received a multicoat of Teflon over asbestos fibers before and after braiding. A fourth packing, Super-Lon, is brown color coded and designed for use over the entire pH scale from sulfuric acid to sodium hydroxide. It is woven of Teflon yarn. A. W. Chesterton Co.

65—POWER SCOOP unloads the bulk materials

Principal use for this automatic power scoop is unloading bulk materials from box cars into track hoppers, elevators, chutes or onto belt conveyors. The scoop makes it possible for one man to unload a box car in 2 to 3 hr, company says, unloading such materials as soy beans, feeds, lime, sand, cement, chemicals, sawdust, nuts and bolts at a time saving of from 30 to 50 per cent. A power unit is furnished along with a suitable metal scoop, sheaves, cables and control wires. This unit is mounted by the user on a rigid base outside of the box car and next to an unloading hopper. The power unit pulls the filled scoop, guided by operator, from inside of car to discharge door by means of a cable winding onto a drum driven by a motor.

When control located in scoop handle is released, the forward action of scoop stops and released control actuates free wheeling feature of clutch, permitting operator to pull scoop back for a fresh start or maneuver it into any position. Depressing the control automatically rewinds cable onto drum. The scoop has a capacity of from 15 to 30 tons an hour. Alden Equipment Co.

66—COOLING UNIT mounts overhead, out of way

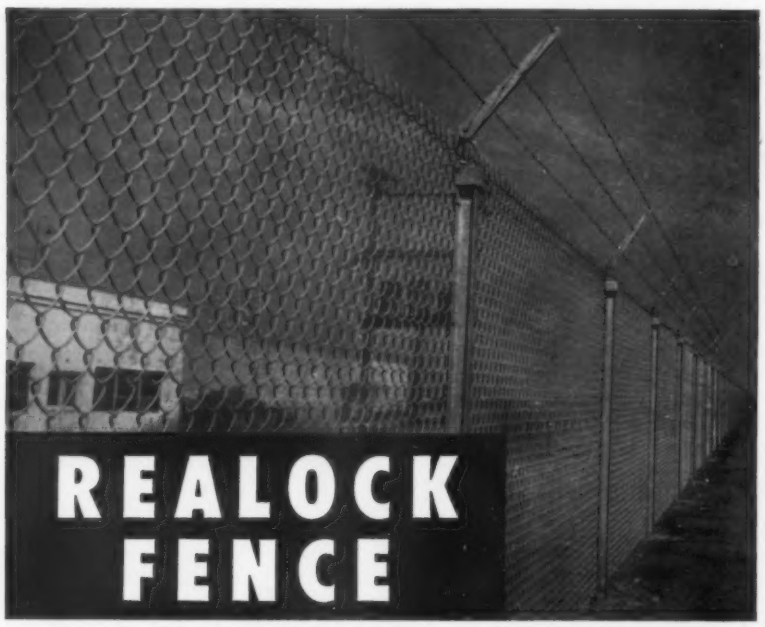
The Sunroc RP-16C (recessed panel) meets even large industrial requirements for refrigerated drinking water,

says manufacturer, yet is small enough to be bolted directly to a column in an overhead location. When installed in an out-of-the-way spot, it is not subject to damage from materials handling equipment, machinery. This cooler is described as economical to buy and install. Installation is possible, in most plants, by hook-up to existing plumbing and drainage facilities. It can utilize existing drinking fountains and other dispensing outlets. The cooler supplies 16 gph of properly cooled drinking water, yet measures only 16¾ in. square. It uses a tube-type cooling method, with water bearing parts of brass, copper. Sunroc Corp.

67—SHACKLES offer higher capacity per size

These shackles are forged from C-1030 steel and heat treated for additional strength. Each shackle has its rated, safe working load stamped on the body. This feature is designed to aid in selection of proper shackle size to do a specific job and help in eliminating accidents due to improper use of equip-

For more facts circle 641 on Reply Card →



...the permanent "Silent Watchman"

Your Realock Fence becomes a "Silent Watchman", on duty both day and night . . . when the plant is in full swing and during the "after-hours" lull. It protects your buildings and property year after year...against trespassers, vandals, arsonists, thieves...and *stays* virtually maintenance-free. Hefty posts are set in concrete. Steel fabric is hot galvanized after fabrication.

And, Realock engineers will help you hand-pick the Realock Fence that's right for your job . . . from a wide variety of types . . . in light or heavy construction . . . with barbed or knuckled selvages . . . with or without barbed wire tops . . . in heights up to 13' overall.

Realock fabric is also available in aluminum for use with steel or aluminum framework. Fabric of other non-ferrous metals can be made to your order.

Ask your nearest Realock representative for complete information and a free estimate. You'll find listings in your Classified Directory.

THE COLORADO FUEL AND IRON CORPORATION — Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION — Buffalo, New York

CF&I REALOCK FENCE
THE COLORADO FUEL AND IRON CORPORATION 5932
BRANCHES IN ALL KEY CITIES
For more facts circle 640 on Reply Card

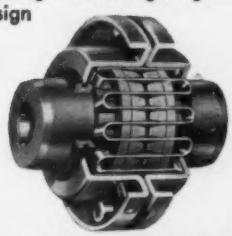
How one FALK coupling saved more than $1,000 per month

Pictured below is a Falk Steelflex Coupling assembly which connects a 2500 hp motor to a reduction unit driving an 18" bar mill in a Midwestern steel plant. This coupling replaced another type which broke repeatedly, causing maintenance expense averaging $1,000 a month—plus costly production losses. Since installation of the Falk Coupling, with its controlled torque mechanism that disengages when a predetermined overload occurs, there has been no interruption of production. Savings in maintenance and in lost production time are well in excess of $1,000 per month...dramatic proof of the importance of coupling design!

Long coupling life is not the sole criterion of coupling performance. Inadequate shaft couplings may be the cause of bearing damage or shaft breakage on your machines. If so, a change to Falk Steelflex will give twofold protection to your connected machines: (1) compensation for reasonable degrees of shaft misalignment, and (2) torsional resiliency to reduce peak loads as much as 30%. These advantages are as important to you as the long service life of the Falk Steelflex Coupling itself.

Falk Steelflex Couplings, in types and sizes to meet virtually all industrial applications, are promptly available from distributor, warehouse and factory stocks. Consult your Falk Representative or Authorized Falk Distributor.

Basic Type F—cutaway view showing exclusive grid-groove design



THE FALK STEELFLEX ...a truly flexible coupling

Here is the coupling that has all the strength of steel, yet is truly flexible. *More than a million* have been bought for industrial service of many kinds.

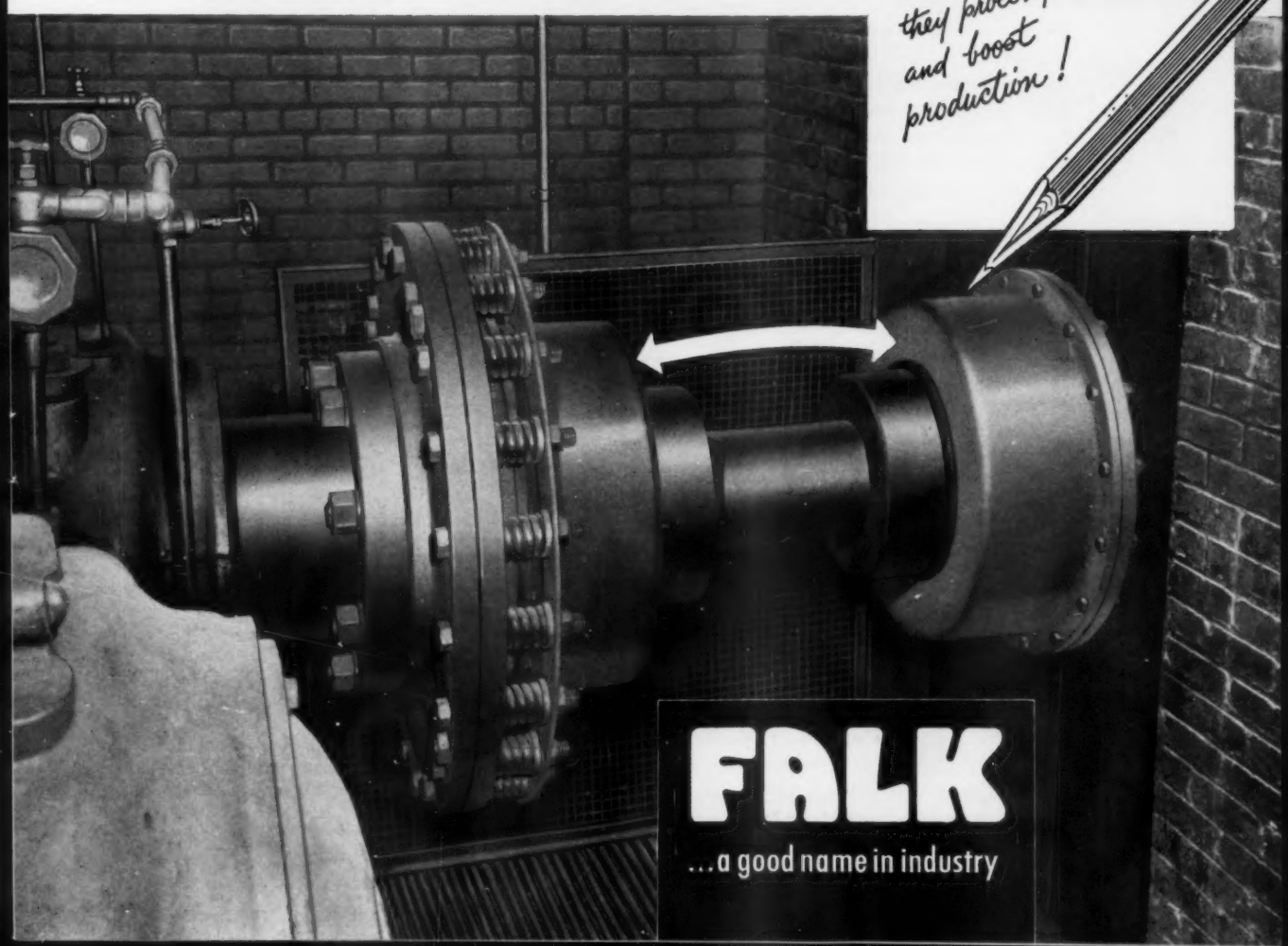
Because, in addition to its inherent superiorities of design, the Type F Steelflex can be used horizontally or vertically without modification or special parts, it has been adopted as standard in many plants—and by many designers and manufacturers of industrial equipment...Write for Bulletin 4100.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in many principal cities

Good couplings not only connect machines; they prolong machine life and boost production!



Have You Figured Your Ratio of . . .

daylight to dollars?

There's more than meets the eye in a brass tacks approach to the problem of the best and most economical glazing medium you can use. Before you decide on any material for windows, skylights, partitions or other openings, remember that glass and glass alone gives you the proven performance you need for better daylighting at lowest cost. Write today for catalog 58-I, containing data on translucent, light diffusing glass. Address Dept. 13.

There is no Substitute for GLASS

- It is non-combustible . . . won't burn
- It is rigid . . . doesn't sag, warp or bend
- It has a permanently hard, impervious surface, unaffected by time, abrasion and exposure to the elements
- It won't corrode or stain
- It resists chemicals, acids, solvents, etc.
- It retains its original clarity and brilliance
- It is easily installed, maintained and cleaned by conventional methods.

MISSISSIPPI GLASS COMPANY
88 Angelica St. • St. Louis 7, Missouri
NEW YORK • CHICAGO • FULLERTON, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

For more facts circle 642 on Reply Card

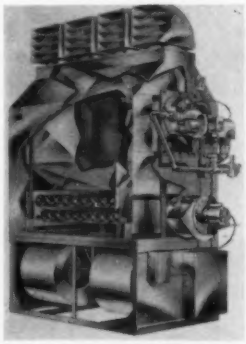
NEW PRODUCTS

(Begins on page 190)

ment. Every shackle has heat treated alloy steel pins or bolts which are always of greater diameter than the shackle body. Load rated, shackles are offered in a complete range of capacities from 1/3 ton through 75 tons. Anchor type with round pin and screw pin, chain type with round pin or screw pin, safety shackles of either anchor or chain type and chain trawling shackles with square head bolt and nut are available. Crosby-Laughlin Div., American Hoist & Derrick Co.

68—HEATERS in capacities to 2,000,000 Btu per hour

Ready for connection to fuel line, power line and vent, these industrial heaters are available in eight sizes with output capacities from 400,000 to 2,000,000 Btu per hour. Heated air is normally discharged through directionally adjustable nozzles. The unit



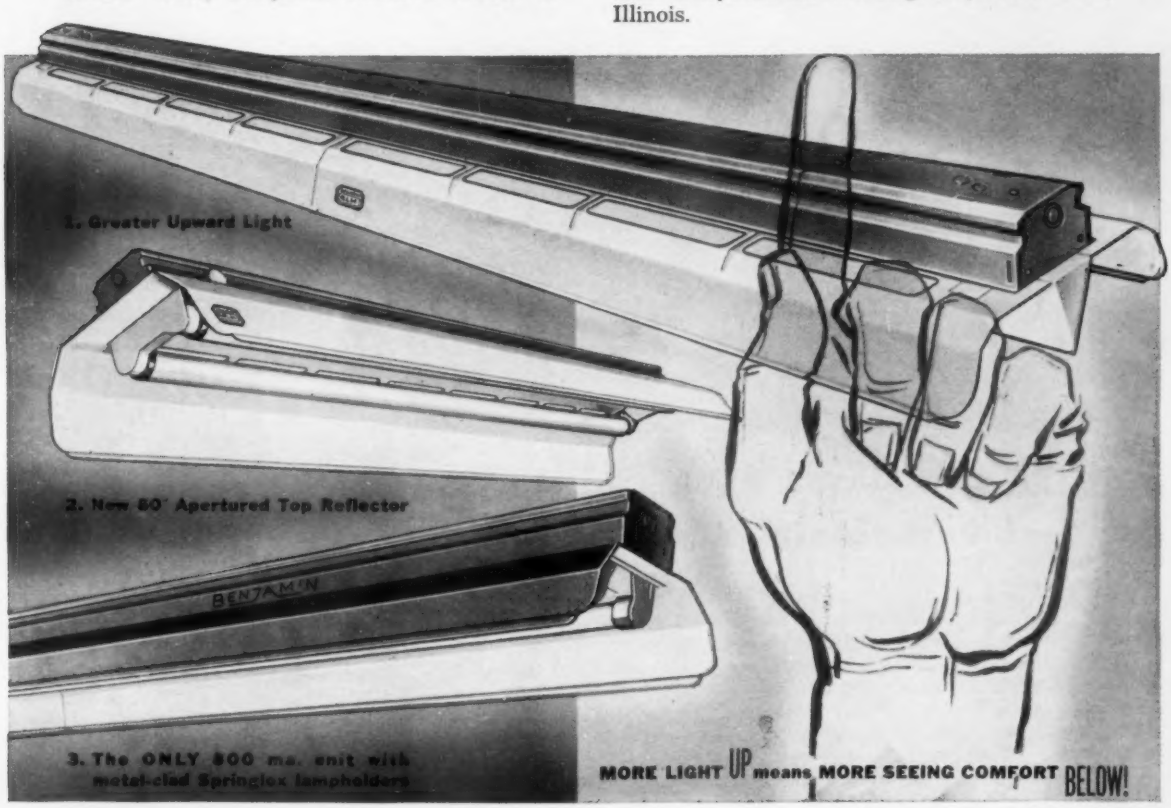
is also adaptable to conventional duct type warm air distribution systems. Heart of the unit is a stainless steel combustion chamber. This is connected to the economizer section, consisting of conventional boiler tubes with high velocity flue gas scrubbers. This construction results in providing four-pass counterflow heat transfer without use of internal baffles, says manufacturer, and efficiency is 80 per cent or better. Gas, oil or combination-type burners are available for the heaters and are interchangeable. The combination-type burner permits quick switch from one fuel to the other without removal of burner parts. Lennox Industries, Inc.

69—IMPROVED BULB keeps tanks from leaking

Water waste caused by leaky toilet tanks can be prevented with the Blue-Spot Balloon Tank Bulb, states manufacturer. The seating surface of this bulb conforms to contour of standard valve seat for maximum surface con-

Take Complete Advantage of the Latest Advancements in Factory Lighting with these 3 NEW BENJAMIN LIGHTING UNITS

Greater seeing comfort through more upward light. More light for the money with new higher output fluorescent lamps. These are new trends in factory lighting; trends that can help plants get a greater return on their investment in machinery, equipment and personnel. Now, Benjamin offers a choice of three new lighting systems so fullest advantage can be taken of these advancements. Each system embodies distinctive Benjamin design and construction features which add to its easy, quick, trouble-free installation. See your Benjamin Catalog for complete details. Benjamin Electric Mfg. Co., Des Plaines, Illinois.


1. Greater Upward Light
2. New 60" Apertured Top Reflector
BENJAMIN
3. The ONLY 800 ma. unit with metal-clad Springlex lampholders
MORE LIGHT UP means MORE SEEING COMFORT BELOW!

1. NEW RLM SD-1 Unit with 25% Upward Light
Seeing comfort in factories is greatly improved with this new Benjamin Upward Component Unit, certified by RLM. It provides higher quality lighting due to 25% upward light, 27° shielding and special high reflecting white porcelain enamel.

2. NEW BENJAMIN UNITS FOR 60" T-17 bi-pin lamps
Expansion and re-styling of Benjamin's 90/100-w line means that you can now get RLM apertured-top reflectors with 15% uplight—as well as a complete line of open and closed-end porcelain-enameled reflectors—in the popular 60" length.

3. NEW BENJAMIN UNITS for HIGHER LIGHT OUTPUT LAMPS—You get 40% more light from the new 800 ma. fluorescent lamps... and with the new Benjamin units you get even more for your money from these new lamps!

B-1479RR

BENJAMIN
...always the source of good lighting
Now Setting the Pace in COMMERCIAL LIGHTING

For more facts circle 643 on Reply Card

(Begins on page 190)

tact and tight shut-off. It is designed to seat perfectly even if guide arm is mis-aligned—also to protect the valve seat from further deterioration and the bulb itself from becoming grooved. A feature of the bulb is its reinforced side wall which serves to keep the bulb from mushing out of shape, a common cause of bulb failure. Inner construction of Blue-Spot creates ballooning action. The side wall expands, adjusting itself to the valve even if the seat is poorly formed, irregular or corroded. This construction also serves to provide greater buoyancy and easier lift when the tank is flushed. J. A. Sexauer Mfg. Co.

70—PATCH MATERIAL is latex formulation

This latex concrete patch material consists of 40 lb of powdered premix and a gallon of latex liquid packaged as a unit in a tapered steel container. Mixed together, a cement colored, mortar-like masonry patching material is provided which, according to manufacturer, has superior bonding properties and doesn't require chipping or edge squaring. Coverage is given as 40 sq ft, 1/8-in. thickness per unit. The material is for use indoors or outdoors, to repair cracks, holes, spalls in concrete walls and floors and for non-shrinking pointing up of joints. The Flintkote Co.

71—PORTABLE SCAFFOLD in many sizes, models

The Sky Witch is a portable hydraulic scaffold offered in a variety of sizes and models, on casters and trailers, and for mounting on trucks. Capacities of standard units range from 750 to 2000 lb; they elevate from 10 to 17 ft. Special models offer larger capacities, higher lifts. Telescoping ladders are

available for the scaffolds and the hydraulic lift may be powered by a 110-v a-c or d-c motor, 12-v d-c motor for operation off truck generator, or 2-¾ hp gasoline engine. Controls are mounted on the platform for raising and lowering the scaffold. A limit switch is set to stop scaffold automatically when it reaches maximum elevation; controls may also be operated from ground level. Safety features announced include 42-in. high guard rails, restricters in hydraulic system to prevent sudden lowering due to mechanical or hydraulic failure. The Charles Machine Works Inc.

72—LOW TEMP SOLUTION for stripping rejects

Kol-Strip is a low-temperature solution for rapid paint stripping of production line "finish rejects." It is formulated for stripping all types of modern organic finishes, including epons, modified epons and acrylics. It is stated that sheet metal panels and other parts which would normally become distorted in higher temperature processes, can be stripped clean in Kol-Strip's 260 to 275 F solution. Kol-Strip is non-inflammable, chemically balanced formula, according to manufacturer; its action is fast and it not only forces a clean break of the paint bond but also dissolves the resins and separates pigments. Kolene Corp.

"A Few Hours Ago That Partitioning Wasn't There!"

Talk about *versatility!* You can use Phoenix Wire Mesh Partitions most anywhere . . . around general stores, stock rooms and tool rooms, or for departmental divisions, corridors and restricted areas. What's more, you can relocate Phoenix partitions as often as required by changes in plant layout. For they can quickly, easily be disassembled and reinstalled . . . oftentimes in a matter of hours . . . by a small crew of your own men.

Wire mesh partitioning offers other important advantages, too. It's ideal where lighting conditions and the free flow of air must be considered . . . perfect where unit air conditioners or heaters are in use. They don't interfere with vision or sound . . . they don't obstruct fire extinguishing systems, either. It's the right answer in fact, to all partitioning problems . . . so write today for Bulletin #58.

SINCE 1885 ONE OF THE NATION'S LEADING MANUFACTURERS OF WOVEN WIRE PRODUCTS

PHOENIX WIRE WORKS, INC.

1958 E. KIRBY • DETROIT 11, MICHIGAN

Telephone: WAlnut 2-4520

For more facts circle 644 on Reply Card

This planishing roll runs as hot as 300° F. Its durable HYPALON cover has processed millions of yards of vinyl floor covering.

HYPALON® Calender Roll Outlasts Rubber 15 to 1

Congoleum-Nairn reports HYPALON synthetic rubber gives 7 months' continuous service in processing hot flooring material. Rubber roll failed in 2 weeks.

Delaware Floor Products Division of Congoleum-Nairn, Inc., uses a HYPALON planishing roll on its calendering machine to help give vinyl flooring material a high gloss. The HYPALON roll presses hot plastic sheeting against a polishing roll. Surface temperatures run as high as 300° F. The machine operates 24 hours a day, 5 days a week.

Due to the extreme heat, abrasion, and attack of plasticizers and compounding ingredients, the rubber planishing rolls used previously lasted only two weeks before surface regrinding became necessary. The new HYPALON covered roll was installed in November, 1956. Since then it has been reground three times . . . twice because of accidental damage. The third time—under normal operating conditions – the HYPALON roll gave *7 months'* continuous service . . . *15 times that of ordinary rubber.*

This marked increase in service life is another example of HYPALON's durability in the face of continued heat and abrasion. HYPALON synthetic rubber has the added advantage of complete resistance to ozone. It has excellent tensile strength and retains its flexibility in temperatures as low as –40° F. It does not support combustion, and can be compounded in white or a complete range of colors that remain stable under exposure to sunlight and weather.

The next time you replace or buy a rubber product, consider HYPALON. See how it will reduce your maintenance and operating costs. The technical representative from your rubber goods supplier can show you the benefits of HYPALON—also of neoprene, the synthetic rubber made by Du Pont for 25 years. For more information, just clip the coupon . . . now, while you're thinking about it.

HYPALON® *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

ELASTOMERS IN ACTION HYPALON® • NEOPRENE

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living
. . . through Chemistry

☐ I am particularly interested in _____

☐ Send me a free copy of *The Du Pont Elastomers* (a review of the properties of neoprene and HYPALON).

☐ Add my name to the free mailing list of the *Elastomers Notebook* (contains articles based on uses of Du Pont elastomers in industry).

E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. **PL-3**
Wilmington 98, Delaware

Name _____
Firm _____
Address _____
City _____ State _____

For more facts circle 645 on Reply Card

Keep plant space flexible with BLAW-KNOX Electroforged® Steel Grating

If expanding production set-ups are cramping feeder and storage areas in your plant, it will pay you to check into Blaw-Knox Electroforged Steel Grating.

Storage platforms of Blaw-Knox steel grating put unused space to work easily, economically. There's nothing to wear, nothing to patch. Blaw-Knox Electroforged grating fits neatly around pipes, beams and machinery without any alterations to the building, and, at the same time, admits maximum light and ventilation to the entire area.

Blaw-Knox Electroforged Grating for walkways, stair treads and floors is fabricated to your specifications to meet your own operating conditions. Complete data on all types is contained in Bulletin No. 2527. Write for your copy today.

BLAW-KNOX COMPANY

BLAW-KNOX

Equipment Division
Dept. H, Pittsburgh 38, Pa.

For more facts circle 646 on Reply Card

AIPE Fourth Annual Meeting

(Continued from page 144)

North Central, Region 3: Paul Bowman, Whirlpool Corp., 850 Arcade St., St. Paul 16, Minn.

Central, Region 4: S. R. O'Haver, International Harvester Co., 5565 Brookville Rd., Indianapolis, Ind.

Southern, Region 5: W. C. Wallin, Western Electric Co., 3300 Lexington Rd., Winston-Salem, N. C.

Western, Region 6: A. W. Kissner, Ford Motor Co., San Jose Assembly Plant, Box 1101, San Jose, Calif.

Canada, Region 7: M. J. Stevenson, Canadair, Ltd., Box 6087, Montreal, Canada.

New England, Region 8: L. J. Monty, Artisan Metal Products, Inc., 73 Pond St., Waltham, Mass.

Continuing a precedent set at the first annual meeting of the Institute, retiring president John M. Waligora was presented with a gavel in recognition of his service to AIPE. The presentation was made by Tom Hanson, editor of Plant Engineering magazine. **End**

Orange County Chapter

(Continued from page 146)

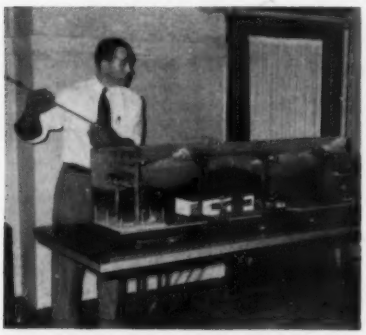
with ruby-set pins of the American Institute of Plant Engineers.

Those honored were: F. A. Yost, Taylor-Wilson Manufacturing Co., 1953; R. W. Hiller, Dravo Corp., 1953; H. N. Leach, Pittsburgh Forgings Co., 1954; F. C. Williams, Dravo Corp., 1955; R. P. Crane, The Duraloy Co., 1956; and H. T. McBride, Pittsburgh Coke & Chemical Co., 1957.

Newark

At a recent meeting of the Newark Plant Engineers Club, members heard an interesting talk by Mr. Herrold Smith, Agricultural Consultant for the Ohio Power Co.

He demonstrated the hazards from fallen tension wires. With a scale model of transmission lines, he illustrated some of the hazards in connection with damage to transmission circuits.



Herrold Smith used scale model of transmission lines to demonstrate hazards

Valley Forge

An additional chore taken over by some of the members of the Valley Forge Chapter is that of serving on the newly formed Water Resources Association of the Eastern Montgomery County area.

In addition to serving as officers or committee chairmen, they are assisting in every way possible to meet the problems confronting this new organization. Because of their plant engineering background, these men hope to be of assistance in seeing that an ample supply of water is provided not only for industrial use but for the thousands of citizens in this area as well. **End**

SHOWN HERE:
A Logansquare cylinder and 2 competitors' cylinders
do they
LOOK ALIKE?
...sure they do
on the surface...
...BUT LOOK AT Logan's
BIG EXTRA PLUS VALUES
Logansquare Cylinders
are made to interchange with other leading manufacturers' cylinders . . .
1 Logan designs assure the service required for those extra-rugged applications.
2 Over FORTY YEARS of cylinder manufacturing know-how.
3 Built by CRAFTSMEN whose average service record with LOGAN is more than 20 years.
4 Manufactured in a plant which applies the most modern production methods.
FREE
SEND FOR THE "LOGAN CALCULATOR"
LOGANSPORT MACHINE CO., INC.
838 CENTER AVENUE, LOGANSPORT, INDIANA
PLEASE SEND COPY OF CATALOG:
☐ 100-1 AIR CYLINDERS
☐ 100-2 MILL-TYPE AIR CYLS.
☐ 100-3 AIR-DRAULIC CYLS.
☐ 100-4 AIR VALVES
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☐ 100-6 ULTRAMATION CYLINDERS
☐ 300-2 PRESSES
☐ FACTS OF LIFE
☐ 200-1 HYD. POWER UNITS
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☐ 200-3 750 SERIES HYD. CYLINDERS
☐ 200-4 AMD 200-7 HYD. VALVES
☐ 200-6 SUPER-MATIC CYLS.
☐ 300-1 CHUCKS
☐ ABC BOOKLET
☐ CIRCUIT RIDER
TO.
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____

For more facts circle 647 on Reply Card

New Plant Construction

(Continued from page 148)

Calif., plans to construct a new warehouse and corrugated box plant on 50-acre site recently acquired for the purpose. New plant will be of steel and masonry construction and will have a floor area of 180,000 sq ft. Plant reported to cost in excess of $2 million.

Houston, Texas—Shell Chemical Corp., 380 Madison Ave., New York 17, N. Y., plans to construct a large water purification plant in connection with its large chemical plant located here. Work on the new unit is already under way and is scheduled to be completed later this year. The purifier will use a fine stage treatment process removing all oil, solids and neutralizing chemicals. The water will then be reused to process chemicals produced by the company. Cost of the new purifier with auxiliary equipment reported to be $500,000.

Longview, Texas—Eastman Chemical Products Inc., subsidiary of Eastman Kodak Co., Kingsport, Tenn., plans to double capacity of its polyethylene plant here. Plans now in work call for the unit to be producing about 85 million pounds of medium and low density polyethylene by late 1958. New expansion is the third since the plant began operation in October 1954 with a capacity of about 20 million pounds per year.

Wallis, Texas—Wyatt's Plastics, Inc., wholly owned subsidiary of Wyatt Metal & Boiler Works, 6200 Kansas St., Houston, Texas, has announced the addition of a second manufacturing facility to present manufacturing plant here. Company will add a large rubber mixing mill, a calendar for the production of rubber sheeting, and a tuber for extruding rubber stock. Plant now has the usual complement of smaller machines and additional equipment will be added in the future as may be required.

Danville, Va.—Merck & Co., Inc., (Chemicals Division), 1935 Lincoln Ave., Rahway, N. J., has announced a major expansion program of company facilities here for the production of ultra-pure silicon and related products. Company expects new units to be in full production of high-purity silicon, used for the manufacture of resistors, transistors, diodes and rectifiers, by early 1959. Cost of new facilities and equipment will represent an investment of better than $5 million.

Parkersburg, W. Va.—E. I. Du Pont de Nemours & Co., Textile Fibres Department, Nemours Building, Wilmington 98, Del., plans to construct a large scale plant near here for the manufacture of a new plastic material developed under the company's fundamental research program. Construction of the new unit, already under way, is expected to be completed by mid-1959. Plant will be located at company's Washington Works on the West Virginia shore of the Ohio River where company manufactures several other plastic materials.

Kohler, Wis.—Kohler Co., manufacturers of enameled and vitreous china plumbing fixtures, 44 High St., has plans under way for the complete modernization and remodeling of its plant for the manufacture of vitreous china plumbing fixtures. Remodeling of the pottery plant will be carried out without interrupting production schedules. Project will cost more than $1.5 million.

Milwaukee, Wis.—Allis-Chalmers Manufacturing Co., 864 S. 70th St., plans to construct a large laboratory facility for engineering, development and research at company location here. New facility will have a floor area of about 23,000 sq ft. Laboratory will be used for scientific studies and for the design, construction and testing of models, mock-ups and prototypes of nuclear reactors and associated equipment. Construction of the new facility will begin at once and is scheduled for completion by early 1959.

with
MICCROSOL Coatings

Eliminate rejects! Protect that finish from scratches and damage. Have your materials-handling hangers, baskets, carriers coated with tough, resilient Miccrosol (industry's finest platisol).

Let us show you how to save parts and money with famous Miccrosol coatings.

Write for full particulars.

MICCRO Products

MICHIGAN CHROME *and Chemical Company*

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For more facts circle 648 on Reply Card

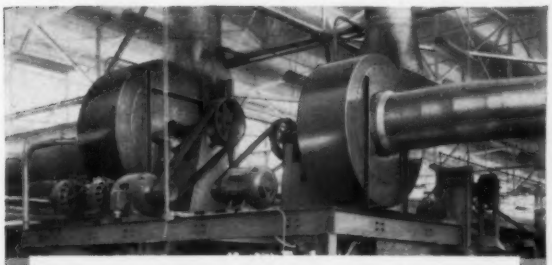
Keeping Plant Cleanliness on a HIGH KEY

at the GULBRANSEN Company

"Master Grand" by Gulbransen
— typical of the exquisite workmanship and superb tone quality of this famous-make piano.

...With the aid of Bayley FANS

*Two large EX Fans serving main shavings exhaust system. CFM totals 48,000.



STANDARD "EX" FANS...
as installed in the Gulbransen plant for exhaust and materials handling, are designed to handle effectively any equivalent problem you may encounter in your own production operations. Bayley specialists are always ready to help you.

The highest possible degree of freedom from dust, trash accumulation, and atmospheric impurities is particularly essential in a plant where a fine product like Gulbransen pianos are made. Utmost efficiency in the design, the apparatus, and the installation of the fan system is necessary to assure these conditions. Large capacity BAYLEY "EX" Fans, installed by Vastine Engineering Co., Chicago, efficiently exhaust dust and waste products at the modern Gulbransen plant.

BAYLEY BLOWER CO.

Engineered Air Handling Equipment

1825 S. 66th Street • Milwaukee, Wisconsin

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NEW! EXCLUSIVE!

VIBRATION-PROOF RADIANT *Lamps*

OLD
NEW
Early lamp failure caused by whipping of long, unsupported lead-in wires, stretching and breaking filament.
Entire mount-unit moves evenly with vibration, thus protecting filament.

All Radiant Industrial Lamps are vibration-proof and weather-proof. They all have this time-tested, strong bridge-type construction. Use Radiant Lamps and stop lamp troubles due to vibration.

SEND for BULLETIN 27

RADIANT LAMP CORPORATION

300 Jelliff Avenue Newark 8, N. J.

Manufacturers of Lamps from 50 to 10,000 watts for PROJECTION • SPOTLIGHT • FLOODLIGHT • INFRA-RED AERONAUTICAL • MOTION PICTURE PRODUCTION • MERCURY VAPOR • GENERAL SERVICE

For more facts circle 650 on Reply Card

You'll find two postage-free Reader Service Cards on pages 251-252. Use them for ordering these new bulletins—just circle item number of those you want. You may also use the cards for requesting advertising catalogs.

How to Get What You Need in Pumps

(Continued from page 142)

be a good guide to assist you in choosing the best way to handle your jobs. (The factors covered in this table are intended to cover the fitting of the stuffing box only for each of the special categories listed. Many other parts may also need special attention.)

Special Stuffing Boxes

A packingless stuffing box consists of a series of breakdown or pressure reducing bushings. These are employed on very high pressure services, particularly on hot boiler feed water applications where pressures across the stuffing box exceed 200 or 300 psi. Some leakage does result but it is controllable and is recaptured to be returned to some low pressure point in the system.

The most special arrangement obtainable is the complete absence of a stuffing box. Thus far the sealless pump design has mainly been employed on such tough services as pumps in nuclear power installations but the basic principle is being expanded to cover more ordinary applications.

Basically this design puts the motor pump connection inside the unit rather than outside so that there are no rotating sealing points. The fact that the rotor of the motor runs inside of the liquid pump results in the liquid passing through what is normally thought of as the motor air-gap. This keeps the liquid from coming in contact with the rotor and stator winding. There is usually a "can" around the rotor and a "can" liner inside the stator.

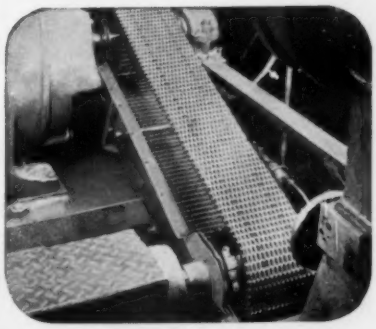
Some day this canned pump design may completely include all pumping applications but if it takes as long to sell this idea to all pump users as it has to convince some people that 3600 rpm is a good logical pump speed—well, better keep this article handy for reference and let your children learn about "canned pumps." **End**

Want Tear Sheets?

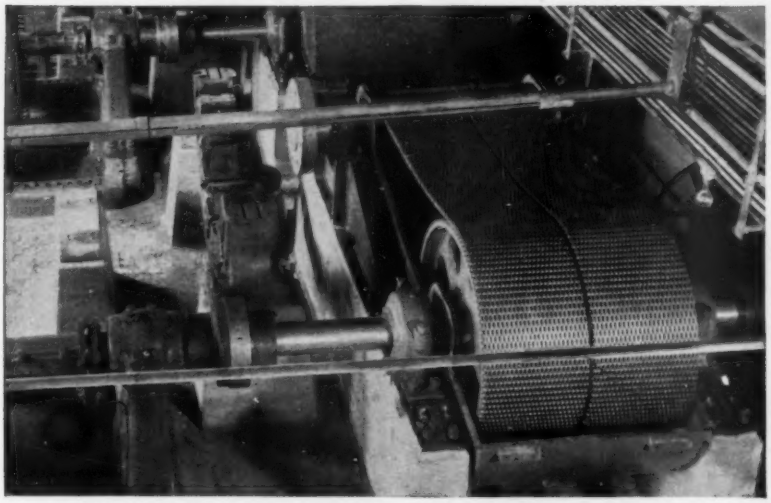
If you'd like tear sheets of any of the articles in this issue just drop a line to The Editor, Plant Engineering, 308 E. James St., Barrington, Ill. We'll be glad to supply them as long as they last.

How LINK-BELT silent chain comes through industry's stiffest tests

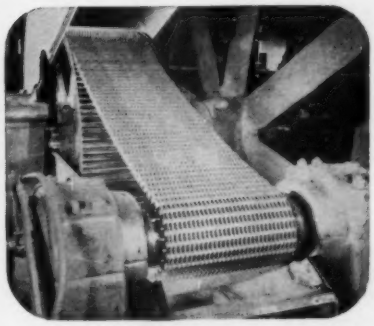
No other drive can do the same



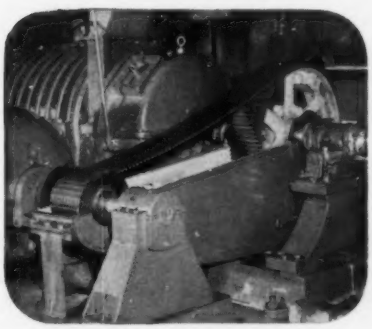
HIGH SPEED. Link-Belt silent chain drives on newspaper presses often operate at speeds of 4000 to 5000 feet per minute.



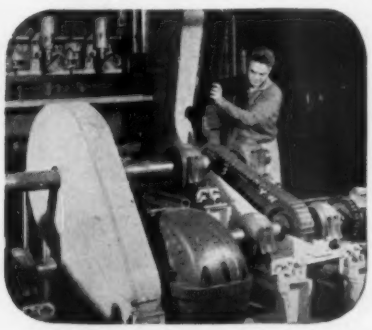
LARGE OR SMALL HP. Two 24-in. strands of Link-Belt silent chain on turbines powering 850-kw generators comprise one of the largest chain drives ever built. Silent chain provides high efficiency (over 98%) on large or fractional hp drives.



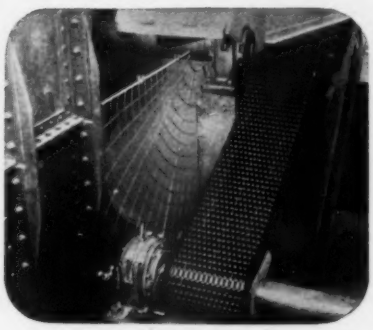
ADVERSE OPERATING CONDITIONS. Effects of heat, humidity and cold are minimized with Link-Belt silent chain drives.



LARGE RATIOS. Link-Belt silent chain operates efficiently at ratios as high as 10-to-1, with resulting space economies.



LIMITED SPACE. Easy to assemble in close quarters, Link-Belt silent chain permits built-in drives, compact housings.



LONG LIFE. Link-Belt silent chain has given more than 30 years of uninterrupted service on ventilating systems.

Ask your Link-Belt office or authorized stock-carrying distributor for

88-page Book 2425

LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,680

For more facts circle 651 on Reply Card

"Pressure Regulators"

(Continued from page 112)

mand load changes are involved.
—where supply pressure variations are large.
—when data regarding flow conditions is unavailable.
—where oversize valve must be used.

11. How About Regulator Size?

Oversizing is one of the most common errors in specifying control valves probably due to the careless assumption that the regulator should be the same size as the pipe line. If the pipe line is suitably sized, a rough rule is that the regulator valve should be at least one size smaller and, in long lines, even several sizes smaller. In any case, the regulator size should be carefully determined.

Aside from the higher cost of the regulator, oversizing results in more severe seating conditions and, in extreme cases, less effective regulation.

Any valve will be subject to less erosion or wire-drawing if it is normally operated near the full open rather than the nearly closed position. When a valve approaches the closed position, fluid velocity through the restricted area of passage becomes high. At high velocities, pipe, scale, condensation or foreign material tend to cut the seating surface.

V-port solid contoured valves have greater immunity from these effects and although precise valve sizing is always desirable, it is less critical with these high lift valves which are normally used only with pilot-operated regulators. In self-operated regulators valve life is necessarily restricted to avoid undesirable droop and it is essential that correct regulator size be given due consideration.

12. Proper Installation is a Prime Requisite.

In all installations of pressure regulating equipment certain simple provisions will result in better performance and substantial savings in maintenance. The dictates of good practice include the following:

Provide a separator and trap if the job involves saturated steam which usually contains condensation. Particles of water in wet steam will cut like solid particles because they are moving at such high velocities. They also produce considerable noise.

Install a strainer as close as possible to the valve inlet on all installations. Foreign matter will be prevented from entering the valve and can be readily blown out by providing a small gate valve on the strainer.

Utilize reducing fittings to mount the regulator valve in the usually larger pipe line. This will prevent unnecessary pressure loss.

By-pass the regulator valve so that it can be attended to without interrupting the functioning of the line. Gate valves are preferable upstream and downstream of the regulator valve itself to reduce pressure loss. The by-pass line should be nearly equal to the regulator size.

Connect the pressure to be controlled with ¼ in. pipe or tubing to a point approximately 10 ft downstream for reducing service or upstream for back pressure or relief service. **End**

Where water is used, process equipment and storage tanks are sure to corrode unless protected by an E.R.P. cathodic protection system. Even with these concrete high rate clarifiers at the St. Regis Paper Company plant near Jacksonville, Florida, it pays to protect the metal parts with an E.R.P. cathodic system.

Engineering PLUS...
E.R.P. cathodic protection pays off in maintenance savings

In industry or public service, water treatment is a big investment. To protect that investment in water treatment equipment could be a tremendous maintenance job. Even with concrete clarifiers, it pays to use E.R.P. cathodic protection. When there are metal tanks involved, just one cleaning and painting can cost more than a complete E.R.P. cathodic protection system.

From preliminary design to continuing periodic corrosion surveys, experienced corrosion engineers measure, analyze and design specifically for your corrosion problems. That is the only way corrosion can be virtually eliminated.

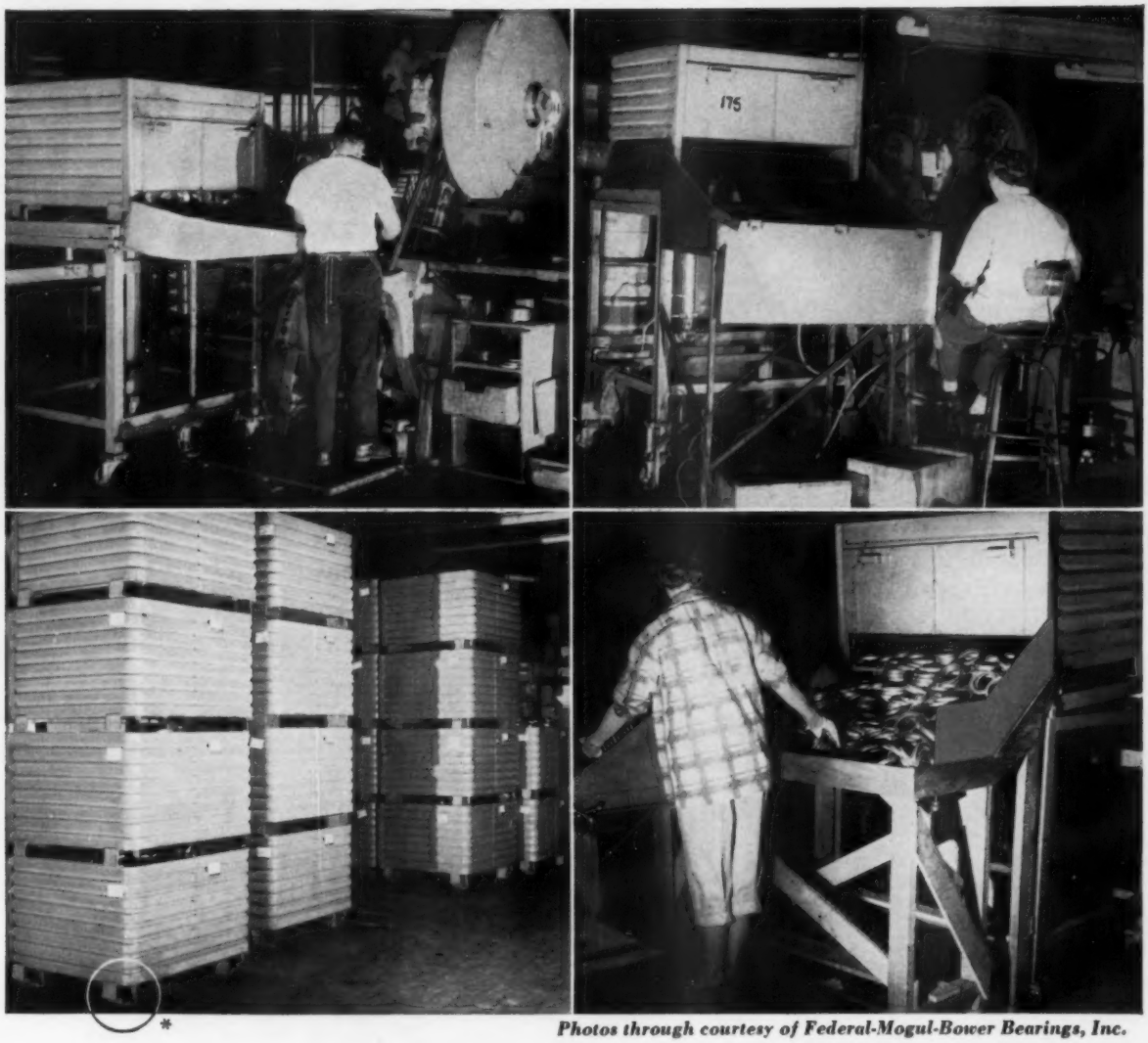
E.R.P. engineering plus prevents corrosion of water storage tanks, water and sewage treatment structures and pipelines. For full information on how E.R.P. can help you save maintenance costs, write for bulletin E-46.00.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
30 MAIN STREET, BELLEVILLE 9, NEW JERSEY
CABLE: ELECTRO, NEWARK, N. J.

For more facts circle 652 on Reply Card

"Oops! Sorry Herb—I'll go get you some more ink."



Photos through courtesy of Federal-Mogul-Bower Bearings, Inc.

Powell Dual-Purpose Flow-Matic® System steps up production and reduces maintenance for the Redwood City, Calif. plant of National Seal Division of Federal-Mogul-Bower Bearings, Inc., while going through major changeover.

Powell developed a special Flow-matic® box to meet unusual interim circumstances at National. Because National ultimately desired a complete Flow-matic® system, yet had to have the new system interchange with the old during conversion, Powell engineers developed a special foot and corner bracing to enable Flow-matic® units to interchange with those of the older style (*note circle above). The conversion program is still going on, and without a hitch.

Here's another example of Powell material handling know-how and the versatility of their great new Flow-matic® system, proved the finest method yet devised for volume handling.

*Patent: No. 2762529

15-A

® T.M. registered by The Powell Pressed Steel Co.

POWELL PRESSED STEEL SINCE 1920

POWELL *flow-matic*®

SYSTEMS

The Powell Pressed Steel Co., Dept. 838, Hubbard, Ohio

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pays for itself!

It's the safe, sensible, economical way to handle wet or dry, hot or cold bulky materials. Simple, one-man operation does the job with amazing speed . . . *cuts cost of hand unloading by at least 50%.*

This rugged Roura Self-Dumping Hopper is built to withstand the terrific knocks and bangs of rough usage. Extra heavy gauge metal and welded construction mean years of dependable service. Fits any standard fork or platform lift truck. Also available mounted on live skids or with malleable or rubber tired casters. Sizes from ½ to 2 cubic yards. Thousands in use in America's biggest industries.

ROURA
Self-Dumping
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ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Michigan

For more facts circle 654 on Reply Card

NEW BOOKS

for the plant engineer

Acoustics

ACOUSTICS FOR THE ARCHITECT. Size 10½ by 8⅜ in.; 126 pp including index; illustrated; cloth bound. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y. Price $10.00.

THE INTRODUCTORY chapter of the book takes into account the over-all problem of acoustics. This is followed by a discussion on the explanation of sound and its behavior. An ensuing chapter deals mainly with structural sound isolation and includes information on acoustical considerations for the installation of equipment.

In the remaining five principal sections of the book, the authors present material on: shapes and surfaces; electronic devices; surveys, computations and tests; materials; and acoustical design procedure.

Atomic Energy Perspectives

PROFIT PERSPECTIVES IN ATOMIC ENERGY. Size 9 by 6 in.; 176 pp; paper bound. Published by American Management Association, Inc., 1515 Broadway, New York 36, N.Y. Price $4.75 to non-members.

THERE ARE a number of factors to be considered in planning for the commercial production of equipment for atomic power uses. This book offers comments on various aspects by a number of contributors.

Some of the topics discussed are: equipment industry outlook; patents and information control; safety and accident record; atomic insurance problems; manpower; company organization for atomic programs; and materials control.

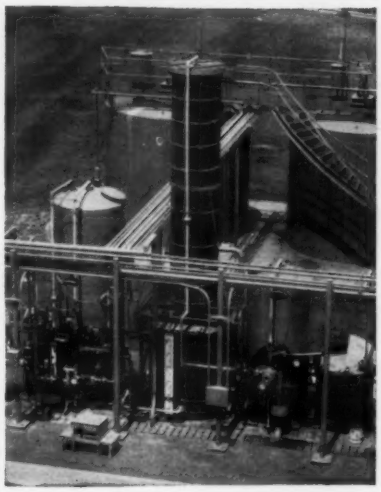
Physics

THE ELEMENTS OF PHYSICS. Size 9¼ by 6½ in.; 671 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $7.50.

EMPHASIS in this sixth edition continues to be on the practical application of physics. The book includes material that relates to engineering, chemistry, biology, medicine and agriculture. There are groups of

ILLCO-WAY

ionXchange



"SILICA: 0.003 PPM, OTHER SOLIDS UNMEASURABLE..."

With some doubt as to the outcome, the de-ionization units pictured above were installed outdoors at a Texas power and light company, to replace evaporation equipment as a means of purifying feed water for a high-pressure boiler. After three years, results far exceeded guarantee and expectations. From raw water containing 27 ppm of silica and dissolved solids totaling 365 ppm, the quality of the effluent is reported as: "Silica, zero to 0.005 ppm, average 0.003 ppm. Other solids are unmeasurable."—This is a good example of what modern ILLCO-WAY ionXchange can accomplish.

BOILER FEED WATER FOR POWER PLANT

The particular plant shown above consists of a cation exchanger, an aerator, and a mixed-bed deionizer. The large tanks in the background hold a supply of regenerants. Operation is manual throughout, a preference of the purchaser. *Results have proved even more economical than expected.*

ionXchange

ILLINOIS WATER TREATMENT CO.

ILLCO-WAY

840 CEDAR ST.
ROCKFORD,
ILLINOIS

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.

For more facts circle 655 on Reply Card

Here's why Pangborn Dust Control boosts employee morale!

The answer is in this book. You'll see why Pangborn Dust Control makes your employees happier, healthier, more efficient in a dust-free plant. Why machinery life is lengthened, housekeeping costs reduced. Why you can reclaim valuable material for salvage. Why you can improve community relations.

Why *Pangborn* Dust Control? Because Pangborn offers the most efficient methods of dust collection on the market. Pangborn has spent 50 years dealing with dust problems . . . experience that is incorporated in every proposal. And Pangborn's extensive line of wet and dry collectors means that one of these units can be adapted with maximum effectiveness to *any* problem.

Send for your copy of "Out of the Realm of Dust." And remember: the Pangborn Engineer in your area will be glad to take off his coat and go to work on your dust problem at no obligation. PANGBORN CORP., *3200 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS **DUST**

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Those Who Seek Quality
CHOOSE
GRAVER®
ELEVATED WATER TANKS

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EAST CHICAGO, INDIANA
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Los Angeles • Fontana, California • San Francisco

The Dependable Source for Elevated Water Tanks
Our 100th Year

For more facts circle 657 on Reply Card
248

NEW BOOKS

problems at the end of subject discussions, answers are provided to odd numbered ones.

Among the subjects discussed in the seven principal sections are the following: friction and simple machines, fluids in motion, rotary motion, sound waves, temperature and heat, illumination and the propagation of light, magnetic fields of currents, electrons and gaseous ions, electronics, and nuclear structure and energy.

Overfire Jets

APPLICATION OF OVERFIRE JETS to Prevent Smoke from Stationary Plants. Revised edition; size 11 by 8½ in.; 22 pp; illustrated; paper bound. Published by Bituminous Coal Research, Inc., 121 Meyran Avenue at Forbes, Pittsburgh 13, Pa. Price $0.50.

ENGINEERING INFORMATION in this revised edition of BCR's Report No. 7 is practically the same as before. The booklet contains material on design and construction of blower jets, steam air jets, silencers and steam jets.

This publication also includes several diagrams showing typical applications of jets. In addition the booklet has some brief information on the control and care of overfire jets, a section on jet location and general comments on overfire jets.

Machining Costs

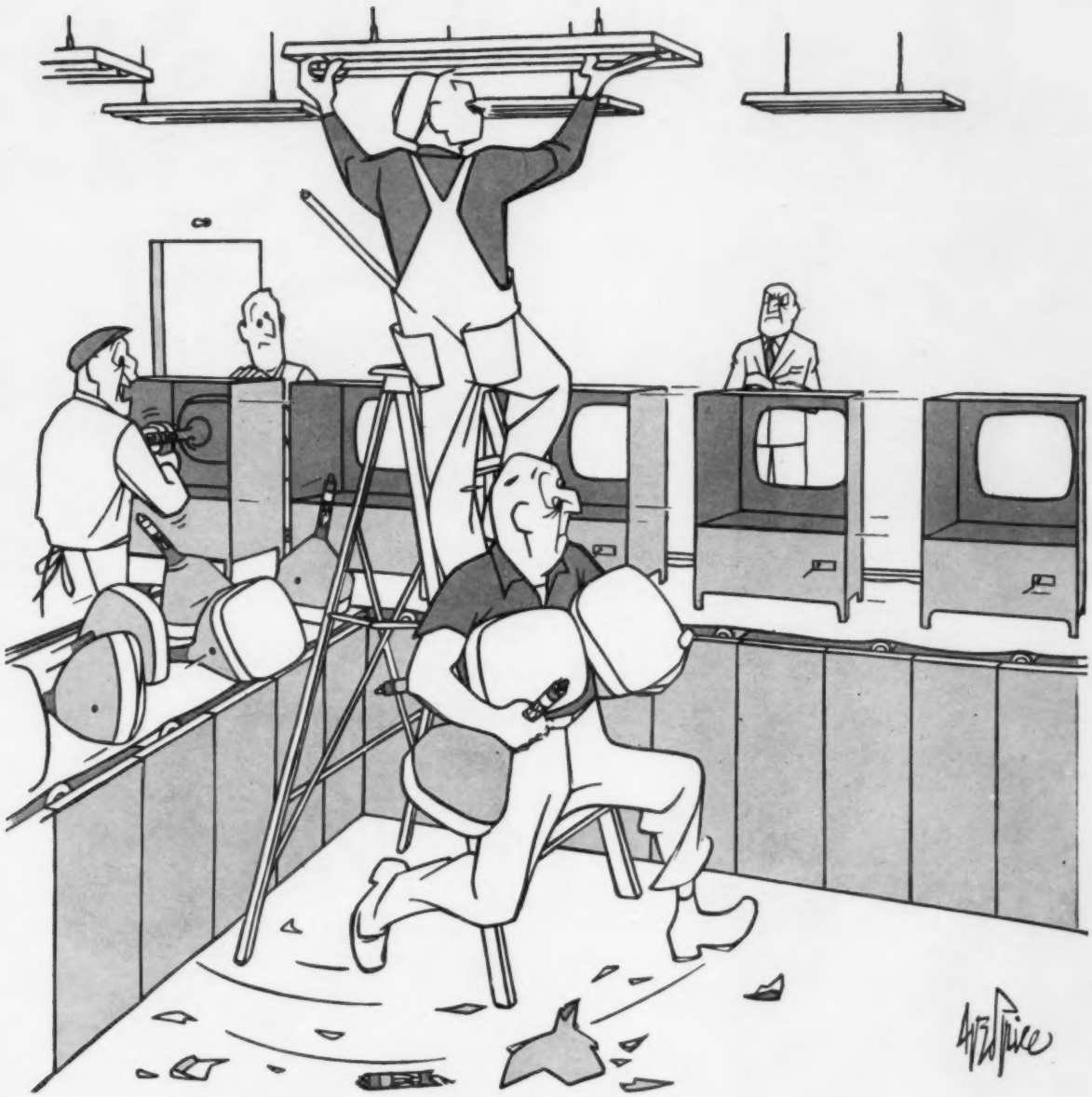
ESTIMATING MACHINE COSTS by C. W. S. Parsons. Size 9¼ by 6¼ in.; 366 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N.Y. Price $8.00.

IN THE AUTHOR'S analysis of the cost estimator's job, the personal and technical background that is needed for this responsibility is discussed. He also tells how the cost estimator operates.

Some of the other subjects treated in the first part of the book are: the relation of engineering and cost estimating; metals and metal removing; and the principle of machinability-R factor background.

The second part of the book deals with cost-estimating applications pertaining to the operation of such machine tools as a radial drill, milling machine, turret lathe, broaching machine, automatic lathe and vertical turret lathe.

Guard Your Heart
1 See your doctor
2 Control your weight
3 Get enough rest
4 Keep physically fit
5 Ease up — and relax
6 Give to fight heart disease
HELP YOUR HEART FUND
HELP YOUR HEART



"Say, you know... one-at-a-time lamp replacement just might be the bottleneck!"

In most plants, one-at-a-time lamp replacement becomes a production—and a production problem.

Fixtures are usually located above machines or assembly lines. They're hard to reach. Work areas get congested—sometimes for as long as 23 minutes per lamp-change. And costs climb (comptrollers, please note) because often the labor cost of replacing lamps one-at-a-time exceeds the lamp price itself.

That's why McDonnell Aircraft Corp. in St. Louis, Mo., listened when General Electric lamp specialists suggested Group Relamping. *Now* maintenance men, working after hours, change *all* 30,000 lamps, dead or alive, every 18 months.

Putting lamp replacement itself on a production basis saves McDonnell $7500 a year. Lighting level is up, and lamp-changing bottlenecks are as obsolete as the biplane.

Compare *your* costs. See how G-E Group Relamping belongs in your plant, office, or store. Call in your local G-E lamp specialist, or write for your free G-E Group Relamping folder. General Electric Co., Large Lamp Dept. PE-38, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 659 on Reply Card

Why Is RIDGID The World's Most Popular Pipe Wrench

...*because* it was a better pipe wrench when first created 35 years ago, and nearly every year since it has been improved . . . in performance, design, materials, so it is still the most for your money. Buy RIDGID at your Supply House.

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THE WORLD'S MOST EFFICIENT POWER EXHAUSTER FOR INDUSTRY

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★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE

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FOR INDUSTRY, Quickdraft provides up to 12 inches static pressure to **exhaust** paint spray, abrasives, corrosive gases, noxious fumes and high temperatures . . . **move** grains, powders, salts and trimmings . . . **recover** metallic waste from foundry stacks. It reduces maintenance costs . . . eliminates down-time for cleaning and replacing fan blades.

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Write for QUICKDRAFT ENGINEERING DATA on your application . . . today.

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BULLETINS

(Begins on page 21)

144 Acoustical Materials—Two noncombustible acoustical materials are pictured and described in this illustrated bulletin. Presents characteristics and specifications for a mineral wool tile and a perforated metal acoustical panel system. Sound absorption characteristics, light reflectance values and flame-resistance ratings given Acoustical Products Div., Baldwin-Hill Co.

WELDING, MACHINING AND METAL WORKING

145 Rotary Tools—Detailed information on rotary cutting tools is presented in 48-pp Catalog F-7, covering every type of tool from H.S. steel to carbide, abrasives, and diamond. The manual is designed to help in selection of correct tool for particular job. Tools are indexed by type, size and machine application. The manual is profusely illustrated with photos, drawings and diagrams showing features of the tools. Precise Products Corp.

146 Masonry Bit Manual—Facts on drilling of masonry materials with carbon-tipped masonry bits are presented in the "What and How" Manual. Tables indicate hole sizes required for common anchors, pipe and conduit, recommended bit to be used for drilling certain size hole in specific masonry material and application data. New England Carbide Tool Co., Inc.

149 Chucking Equipment—Chucks, collets and other chucking equipment are presented in 24-pp Form 1117-C. Generously illustrated, catalog gives application and dimensional data. Also provides information on power chuck wrenches and air cylinders and includes a section on special work-holding equipment illustrated by job applications. Gisholt Machine Co.

150 Tungsten Arc Welding—Catalog 2300, 24 pp, features an inert-gas-shielded tungsten arc welding process for rapid joining of light gages of most engineering metals and alloys. Advantages of the process are detailed and manual, semi-automatic, automatic and accessory equipment covered. Description and specifications for tungsten electrodes given. Air Reduction Sales Co., Div. of Air Reduction Co., Inc.

153 Foot Squaring Shears—Bulletin 80-FC, 12 pp, illustrates and describes latest design and operating features of company's foot squaring shears Series F and Series G (with gap) for light sheet metalworking. Cutting lengths and capacities of all models are given in a full page of specifications. Niagara Machine and Tool Works.

154 Vibration Control—Bulletin K3B gives latest data on stopping vibration, shock and noise transmission by using steel spring machinery mountings. Describes company's Vibro-Isolators and includes typical case histories of actual installations, as well as data tables giving capacities and characteristics. The Korfund Co., Inc.

MATERIALS HANDLING

156 Lift Trucks—This 14-pp "cutaway" brochure, "The Inside Story," describes company's Worksaver line of rider-walkie trucks. Using sectionalized views and a system of die-cut pages, the booklet pictorially disassembles the Worksaver to point out all its operating features. The Yale & Towne Mfg. Co.

157 Skid Platforms—Catalog LS-58, 16 pp, describes company's line of skids and allied products, including skid platforms, sectional bins, skid boxes, jacks and Rollaway semi-live skid systems. Includes full specifications and construction data. The Lanham Co.

158 Vertical Transportation—Selection of vertical transportation for every traffic-moving job is detailed in 32-pp Bulletin A-382. Various types of elevators and escalators for a variety of commercial and industrial applications are described and dimensional diagrams illustrating arrangements included. Recommended sizes and capacities are listed. Otis Elevator Co.

159 Shelving, Handling Equipment—This 24-pp catalog features a line of bin-type units, small parts cabinets and cases, shelf boxes and shelf drawers, steel shelving, stacking boxes, tool carriers, service trucks, and work stands. Specification and dimensional data included, along with photos and drawings of the units. Bay Products Inc.

CHAIN, FITTINGS

160 Chain for Many Services—Catalog 610, 304-pp, contains descriptions, specifications, application information and selection data on products for power transmission, conveying and elevating service. Lists chain for practically every power transmission, timing, tension and conveying application. Basic selection data for common types of applications, as well as detailed information for each major chain classification is included. It also lists cast and cut-tooth sprockets, bearings and take-ups, elevator buckets, belt conveyor products; accessories. Catalog is available to qualified plant engineers; Please state your job title when requesting it. Chain Belt Co.

161 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Also announces range of sizes and capacities in many of items listed, as well as new products, ranging from wire rope clips, chain links, clevis links, weldless sling and end links, swivels, shackles, hooks, cargo handling hooks, turnbuckles, thimbles, sockets, eye bolts and similar fittings. Crosby-Laughlin Div., American Hoist and Derrick Co.

ELECTRICAL

162 Induction Motors—Sixteen-pp Bulletin 1950 presents detailed information on a full line of large induction motors in ratings from 150 to 1250 hp. Cutaway drawings and illustrations show design and construction features. The Louis Allis Co.

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164 Mill Motor—Design features of company's 620 frame mill motor are detailed in illustrated Bulletin PB 9000-2. Electrical details are described, including design and construction of armature coils and field coils. Mechanical design features are also covered. Elliott Co.

165 On Transformers—Some of the research facilities for company's wide line of transformers along with their design and construction features are described in 20-pp Bulletin 61 B 6186C. Covered are power transformers, unit substation, secondary network, industrial application, furnace, distribution, and instrument transformers. Allis-Chalmers Mfg. Co.

166 Outdoor Stations—Bulletin GEA-5573B, 20 pp, discusses integrated stations, rated 7.5 to 230 kv, from plans to installation. Describes station construction, typical arrangement of stations from simple step-down to complete sub-transmission station. Includes charts, pictures, line connections and dimensions. General Electric Co.

167 Low Voltage Switchgear—Bulletin 6004-C, 20-pp, discusses advantages of company's line of low voltage switchgear. Includes application and selection data, curves showing short circuit currents in low voltage systems, and detailed specifications and typical switchgear assembly layout. I-T-E Circuit Breaker Co.

168 Distribution Switchboard—A low-voltage distribution switchboard, which accepts any combination of six different types of protective devices, is the subject of 32-pp Bulletin GEA-6627. Lists features, application data, protective device information, system applications and selection, dimensions and specifications. General Electric Co.

169 D-C Contactors, Relays—Catalog GEA-6621, 32 pp, covers general purpose contactors, mill-type contactors, time-delay contactors, general purpose relays, timing relays, instantaneous-overload relays, thermal-overload relays, field-loss relays, field accelerating and decelerating relays, and high drop-out relays. Extensive selection and application data is provided, including ordering instructions, full product descriptions, photos and pertinent data. General Electric Co.

170 Semi-Conductor Rectifiers—Bulletin 12B8897 describes semi-conductor rectifiers—germanium, silicon and selenium—particularly applicable in the electro-chemical industries as well as general industry. The three types of semi-conductor rectifiers are applied for director currents and voltage ratings as indicated on a chart. Allis-Chalmers Mfg. Co.

171 Motor Controls—Illustrated 56-pp Catalog 5800 features quick selector

BULLETINS

(Begins on page 21)

tables giving horsepower, motor speed, heater size and heater ampere ratings plus enclosure choices and prices in one easy to read table. In addition, it contains design data, prices, and ordering instructions for magnetic starters and contactors, drum controllers, pressure switches, push buttons and other motor control and pilot devices. Furnas Electric Co.

172 Individual Motor Controls—Bulletin GEA-6584, 8 pp, discusses coordinated starters for low-voltage motors up to 600 v, 1500 hp, and three phase. Describes controls for squirrel-cage, wound-rotor, and synchronous motors; cites features and applications of various starters; provides data on short-circuit protection for low-voltage individual starters; and discusses contactors, overload relays, and accessories and modifications for individual motor controls. General Electric Co.

173 Interlocked Cable—Twelve-pp Bulletin RCP-730 describes four types of interlocked armored cables: 600-v, 5000-v, 15,000-v grounded neutral and 15,000-v undergrounded neutral. Covers installation, circuit flexibility, accessibility, moisture resistance, mechanical toughness, ampacity and space requirements. Tables show AWG or MCM size, number of strands, insulation thickness, diameters, weights and current ampere ratings. Technical data on the 15,000-v underground neutral cable includes correction factors for ambient air temperatures, aluminum conductors. Rome Cable Corp.

174 Heating Cables—Bulletin 19-457, 10-pp, contains detailed information on heating cables, their application and installation. Product information and specification data on five types of cable are given: lead-jacketed, silicone rubber, asbestos-braided, silicone rubber resistance wire. General Electric Co.

175 Underfloor System—Sixteen-pp Catalog 857 describes and illustrates Power Raceway—an underfloor electrical distribution system for industrial and commercial buildings. Catalog includes dimensional drawings and describes duct, supports, junction boxes and fittings. Walker Brothers.

176 Wrought Iron Conduit—Included in 8-pp Form 680 on wrought iron pipe is a discussion of the metal's composition and a description of the added corrosion protection provided by company's sherardizing method of galvanizing and acid resistant vinyl enamel processing. In addition to appropriate photos of actual installations and a list of suggested uses, book contains specifying information, dimensional data. National Electric Products Corp.

177 Stationary Batteries—Twelve-pp Bulletin GB 1783 is offered to aid in selecting and installing Gould Plante batteries in switchgear, alarm systems, signalling, emergency lighting, other services where batteries are used for standby power. Engineering specifications tabulated include ampere-hour capacity, discharge rates, overall cell dimensions, weight per cell and electrolyte required. Installation data is given with recommended dimensions for storage racks in two- and three-step and double tier constructions. Gould-National Batteries, Inc.

178 Silicon Chargers—Bulletin AR-100/58 covers use, design and construction of company's line of silicon chargers for 12 v electric industrial trucks. Charging characteristics are plotted on a curve, and details and specifications are given. C & D Batteries, Inc.

179 Insulating Tapes—Application information and specifications for a line of pressure sensitive electrical tapes and epoxy resins for electrical insulations are listed in this 32-pp catalog. Contains physical and electrical properties, suggested applications and procedures. In addition to product information section, catalog contains selection data. Includes recommended tests for corrosion, guides for choosing electrical tapes, temperature limitation chart. Minnesota Mining and Mfg. Co.

DUST CONTROL

180 Industrial Dust Control—Bulletin 104, 36 pp, on company's dust filters, gives detailed information about dust control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other Dynaclone and automatic continuous dust filters, intermittent filters, and unit and economy filters. Also provides dust filter and dust control system specifications, as well as hopper and support data. An engineering section gives step-by-step procedure for determining type and size of hooding, piping, filter. The W. W. Sly Mfg. Co.

181 Dust Filter—Eight-pp Bulletin G-579 describes industrial dust control utilizing company's dust filter with non-variable air volume counter flow for maintaining filter media porosity. Includes cutaway views, dimensions and specifications. The Day Co.

SAFETY

182 For Fire Protection—Twelve-pp Catalog P-40 describes and illustrates portable fire extinguishers, built-in carbon dioxide fire extinguishing systems, smoke detecting systems and rate-of-rise fire detecting systems. Equipment covered is for industrial, institutional and commercial fire hazard applications. Walter Kidde & Co., Inc.

183 Industrial Gloves—This industrial glove catalog gives complete specifications and factual information on company's entire line of liquid-proof gloves. A detailed data sheet gives performance of gloves when used with over 100 oils, acids, caustics and solvents. The Pioneer Rubber Co.

OTHER EQUIPMENT

184 On Photodrawings—A modern technique of using photos to convey engineering drawing information in easy-to-visualize form is described in 12-pp Pamphlet P-22. Discusses two methods of preparing photodrawings for use in various areas of industry including assembly, inspection and engineering. Includes sections on making the picture, equipment and materials needed, making master photodrawing, direct process reproduction, halftone methods, others. Eastman Kodak Co.

185 Wall Deslagger—Bulletin 1034 describes design features of furnace wall deslaggers designed to minimize average slag thickness for consistently high-heat-transfer capacity, and for uniform superheat and reheat temperature control. Cross-sectional drawings and schematic sketches included. Copes-Vulcan Div., Blaw-Knox Co.

186 Low-Level Condensers—Bulletin 5AB, 8 pp, describes company's line of low-level condensers for condensing steam, under vacuum, at ground level. Application, construction and operation information on both types of condensers is furnished, and complete sizing data, as well as capacities, weights, and dimensions included. Schutte and Koerting Co.

188 Plastic Materials—The 12-pp 1958 edition of the "Condensed Reference File" describes major families of plastics produced by this company. Profusely illustrated, booklet has thumb-indices to aid in finding data on polyethylenes, vinyls, styrenes, phenolics and epoxies. Bakelite Co., Div. of Union Carbide Corp.

191 Silicones as Dielectrics—Outlining the properties of silicones as dielectric materials, this brochure also discusses the use of silicone rubbers, fluids, resins, and compounds in applications ranging from electric motor insulation to intricate electronic control systems. Laboratory data and photos of applications are included. Dow Corning Corp.

192 Refractory Mortars—Six-pp Bulletin 600 covers the refractory mortars manufactured by this company. Included are installation photos, product features and technical data containing recommended maximum use temperatures, fusion, types of set, form, pounds required per 1000 brick for trowelling, dipping and brushcoating as well as gal of water required to trowel and dip the mortars. J. H. France Refractories Co.

193 High Capacity Chlorinator—Twenty-pp Catalog 70-15 describes features, construction and application of a vacuum-type, solution-feed, high capacity gas chlorinator suitable for manual, semi-automatic or fully automatic operation in capacities from 60 to 8,000 lb of chlorine per 24 hr. Dimensions and specifications are included, as well as typical installation diagram. Fischer & Porter Co.

194 Processing Equipment—Bulletin 380, 24 pp, describes processing equipment for chemicals, food products and by-product recovery. Gives mechanical descriptions and specifications of equipment such as evaporators, drum, rotary, pan and vacuum dryers, flakers and cooling drums, spray dryers, autoclaves, quick-opening autoclave doors, processing kettles, pilot plant and laboratory equipment, Nauta mixers, gas cleaners, and special equipment. Buflovak Equipment Div., Blaw-Knox Co.

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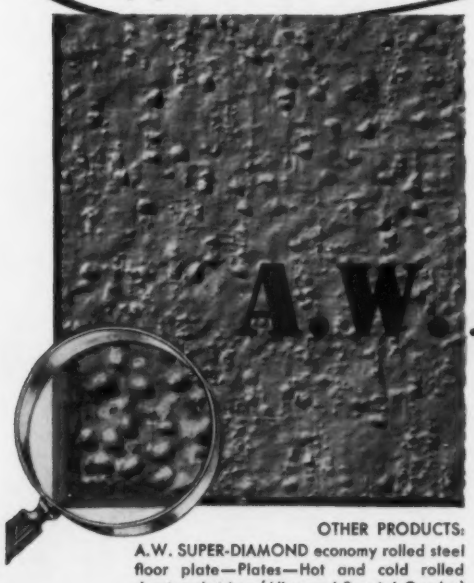

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VALVES, TRAPS, PIPING

301 Valve Performance Facts—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

302 Unions, Check Valves—Illustrated Catalog 55, 24 pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Clayton Mark & Co.

303 Industrial Valves—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, check valves. W. S. Rockwell Co.

304 PVC Valves, Fittings—This 16-pp bulletin describes polyvinyl chloride valves and fittings offering resistance to most salts, alkalis and acids. Bulletin provides application tables on performance of normal impact PVC valves and fittings for handling 315 fluids. Cutaway drawing and text detail design features. Walworth Co.

305 Hydraulic Control Valves—Catalog 200-7, 16 pp, describes construction features and advantages of company's line of hydraulic control valves. Photos, dimensional diagrams, circuit wiring diagrams and data included. Logansport Machine Co., Inc.

306 Silent Check Valves—Bulletins WH-654, WH-754, and Bulletin 856 feature descriptive and engineering data on company's line of silent check valves for a variety of applications. The bulletins cover center guided, globe type, and a silent gas-air check valve, describing features and giving operation and specification information. The Williams Gauge Co., Inc.

307 Gate Valves—Money-saving advantages of King-Clip gate valves are described in Circular 561. Illustrated with cutaway drawings and photos, bulletin gives detailed data, tables of steam and water-oil-gas pressure ratings. Lunkenheimer Co.

308 Corrosion Resistant Valves — Eight-pp Bulletin 8 provides engineering specifications and a discussion of the advantages of Aloyco 20 valves. Basic types and adaptable features of these corrosion resistant valves are presented. Includes data on corrosion tests on this metal with various concentrations of sulfuric acid. Alloy Steel Products Co.

309 Lubricated Plug Valves—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

310 Valve Comparison Chart — Form 194R-1, 22 pp, is a valve camparison chart, listing valve figure numbers of 15 major manufacturers and the OIC equivalent valve figure numbers. Compares variety of valves in ferrous and nonferrous materials, describes valve liners. The Ohio Injector Co.

311 Valve Lubrication—This 19-by-24-in. chart contains maintenance and lubrication information for company's lubricated plug valves. Of heavy paper with metal edges, the chart features detailed exploded views of four types of valves and includes a table of recommended lubricants for oil, water, gas and chemical service. Meter and Valve Div., Rockwell Mfg. Co.

312 Impulse Steam Traps—Bulletin T-1742, 8 pp, describes how the impulse steam trap works and includes complete details on pressures and temperatures, materials, capacities, weights and dimensions. Photos are used to illustrate typical installations. Yarnall-Waring Co.

313 High Pressure Coupling—Bulletin 250 describes company's versatile coupling for high pressure systems, gravity flow systems, and vacuum systems. Cutaway view showing design features is included, along with descriptive data. Snaptite, Inc.

314 Pipe for Modern Buildings — This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings. A. M. Byers Co.

315 Swivel Joints—Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on products, booklet is well illustrated. Chiksan Co.

316 PVC Pipe, Fittings — Bulletin PE-40, 12 pp, describes physical properties and chemical resistance of company's PVC pipe and fittings designed for process industries. Plumbing and installation data is included, as well as pipe and fitting dimensions, valve dimensions. Corning Glass Works.

FILTERING

317 Data on Filters — Provided in this general catalog are product bulletins covering company's Staynew line of filters. These include intake filters, pipe line filters, liquid filters, hydraulic filters, automatic filters, dry panel filters, viscous panel filters, others. Catalog is available to qualified plant engineers. Dollinger Corp.

318 Filtration Equipment — Bulletin A-943 on industrial filtration equipment, covers company's Vacumatic filters, flotation equipment, Magnaflo separators for removal of ferrous solids, oil conditioner, cartridge filters, others. Includes application tips. U. S. Hoffman Machinery Corp.

319 Filters For Industry — This loose-leaf notebook contains a series of bulletins with detailed information and specification data on filters, aftercoolers and cyclone separators. Among those featured are Bulletin 117 on air filters, Bulletin 431 on filters for the chemical process industries, Bulletin 650 on general service filters and Bulletin 711 on cyclone separators and pipe line aftercoolers. R. P. Adams Co., Inc.

320 Filters, Strainers—Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are also presented. Purolator Products, Inc.

MECHANICAL POWER TRANSMISSION

321 Magnetic Drives—Data on design, drive features, opening and performance curves, output torque rating-dimensions, selection chart, as well as photos of installations and applications are included in 6-pp Bulletin W-T 1-57. Whitney Chain Co.

322 More Power per Pound—Book 2447, 28 pp, describes company's line of Gearmotors and Motogears, both designed in keeping with NEMA motor sizes which deliver more horsepower per pound. Provides complete selection data together with construction features, load classifications, dimension tables, overhung load ratings and mounting assemblies. Link-Belt Co.

323 Power Transmission Machinery —Bulletin A-646A, 8 pp, contains data on company's power transmission machinery, including sheaves, sprockets, bushings, conveyor pulleys, couplings, speed reducers, clutches, bearings, take-ups, V-belts, collars, and steel transmission pulleys. Also described is a dry fluid drive. Dodge Mfg. Corp.

324 Power Transmission Equipment —Form 1200, 12 pp, describes a full line of conservatively rated equipment for various power transmission requirements, including flexible couplings, variable speed pulleys, variable speed belts and sheaves, variable speed transmissions, motor bases, and universal joints. Dimensions and capacities given. Lovejoy Flexible Coupling Co.

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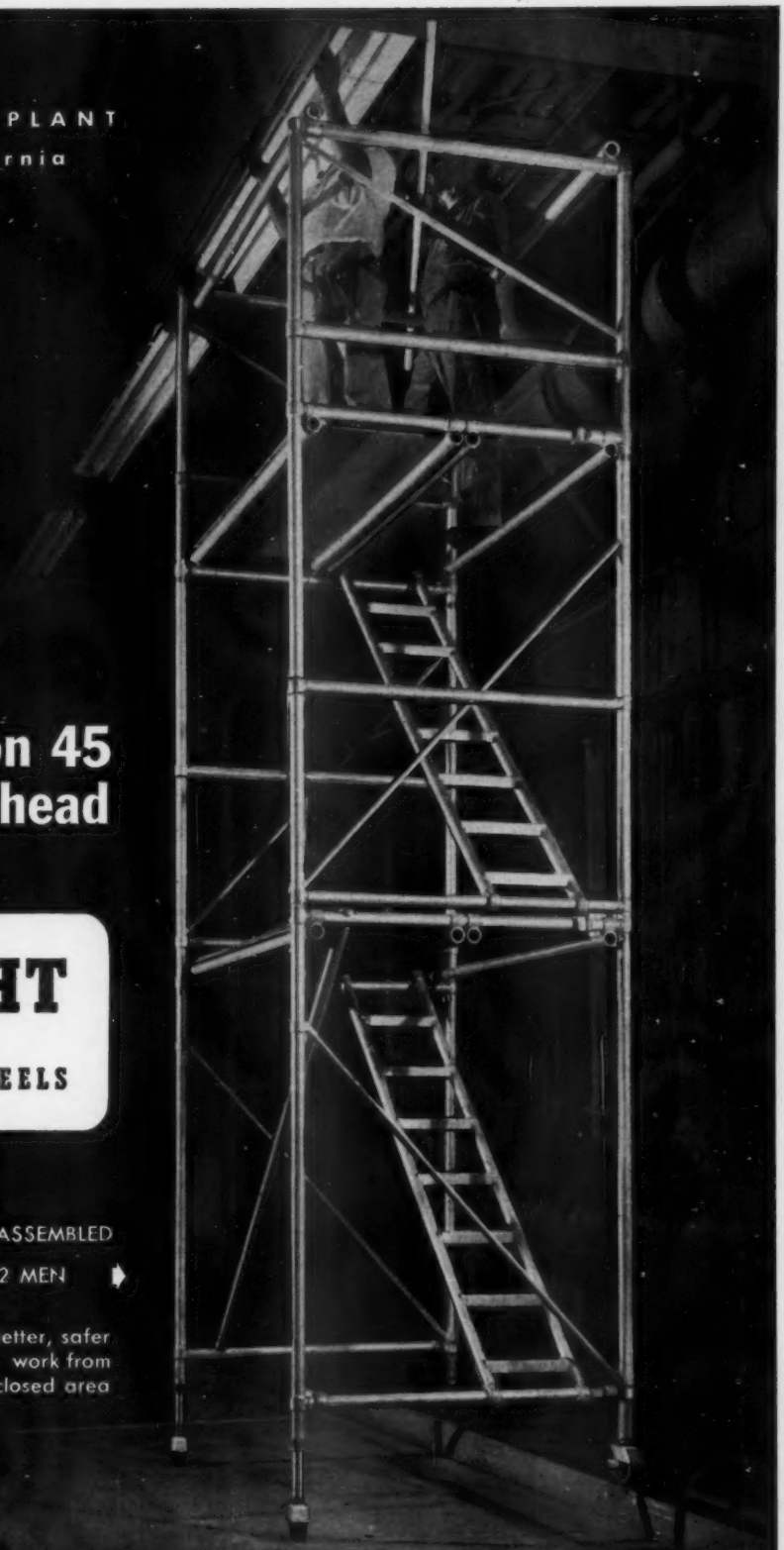

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(Begins on page 256)

325 Transmission Products — Catalog 914, 88 pp, features company's transmission products and their uses in elevating and conveying machinery. Descriptive information with drawings and tables of dimensions covers shaft collars, couplings, clutches, pillow blocks, tape-ups wheel hubs, gears, holdbacks, chains and sprocket wheels. The Jeffrey Mfg. Co.

326 Chains, Sprockets—Catalog 757, 68-pp, on company's stock roller chains and sprockets, stresses advantages gained through roller chain use, and pictures some typical roller chain drives. Tells how to select a stock roller chain drive. Provides specifications, ratings, prices and engineering data required for ordering. Book is generously illustrated with photos and drawings. Diamond Chain Co., Inc.

327 What's In a V-Belt?—Informative little 16-pp Booklet S-51105 describes raw materials used in producing V-belts. Natural and synthetic rubbers, cotton and synthetic cords, rubber chemicals and steel cables used in company's line are subjects for explanations of each material's role in the final product. Goodyear Tire & Rubber Co.

328 Improved Belting—Featured in this 12-pp catalog is a new type of power transmission belting made of polymer and chrome tanned leather, designed for superior strength and elimination of stretching. Sections of catalog cover significant applications, selection of proper belt type, tensioning maintenance. Extremultus, Inc.

329 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are detailed. Thomas Flexible Coupling Co.

330 Spacer Coupling—Of special interest to plant engineers concerned with operation of many pumps is Manual 4838 on this company's Type F Steelflex spacer coupling which has a quick-disconnect feature. Step-by-step illustrations show how to install, remove coupling and lubricate it during assembly. The Falk Corp.

331 Dihederal Spindle Couplings—Catalog 64, 12 pp, covers the development, production and application of company's dihederal spindle couplings for roller drives. Cross-section drawings and dimensional data are given on sizes and types of spindle couplings. Ajax Flexible Coupling Co., Inc.

332 Cylindrical Roller Bearings — Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings on hot and cold rolling mills. SKF Industries, Inc.

333 Sealing Compounds—Twelve-pp Bulletin 7009 describes Titeseal, a group of sealing compounds, each designed for a specific purpose. Tells where Titeseal is used, how it is used, and how it acts to stop leaks and waste and prevent seizure of parts by rust and corrosion. Describes basic Titeseal blends. Radiator Specialty Co.

334 Teflon Products—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

335 Piston Packing—Sixteen-pp Bulletin 5503 presents engineering data on Darcova Pumcups for packing pistons of air cylinders, hydraulic cylinders and reciprocating pumps. Included are operating diagrams and a list of typical installations, as well as helpful data on Pumcup compositions, textures and types made available for specified pressure, temperature and corrosive conditions. Proper compositions are identified for various gases, acids etc. Darling Valve & Mfg. Co.

PUMPS, COMPRESSORS

336 Braided Packing—Form AD-131, 8 pp, describes lattice braid packings designed for longer service life and lower maintenance. A table of general recommendations gives essential data, and a table of lengths and weights is included. The Garlock Packing Co.

337 General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

338 Sewage Pumps—Twelve-pp Bulletin 7500 illustrates heavy-duty wet and dry pit sewage pumps, small vertical sewage pumps and standard and submersible cellar drainers. Includes performance tables for selecting pumps, dimensional drawings and details of construction. The Deming Co.

339 Vertical Non-Clog Pumps—Catalog F-100 describes advantages of company's vertical non-clog pumps, designed for sewage disposal, underpass service and drainage, and for many applications in reduction plants and paper mills. Three different dry pit installations are shown, and a cutaway illustrating mechanical features included. C. H. Wheeler Mfg. Co.

340 For Abusive Pumping Jobs—Catalog 4906, 36 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

341 Condensed Pump Data—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate unit, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, features. Goulds Pumps, Inc.

342 Industrial Air Compressors—Advantages of company's line of industrial air compressors are detailed in 16-pp Catalog 5510. Tables indicating weights, code words and dimensions are included, as well as cutaway views showing design and operation details. Compressor specifications are given, and dimensional diagrams and other material included. Schramm, Inc.

343 Motor Driven Compressors—Bulletin 118, 52 pp, presents company's balanced/opposed motor driven compressors, stressing advantages of design principle utilized. Specific benefits of the balanced/opposed construction are explained, and three models in the line are covered. Lubrication, cylinder efficiency and other aspects are also treated. Eighteen installation photos show these units in air compressor, soot blower, chemical and refining service. Clark Bros. Co.

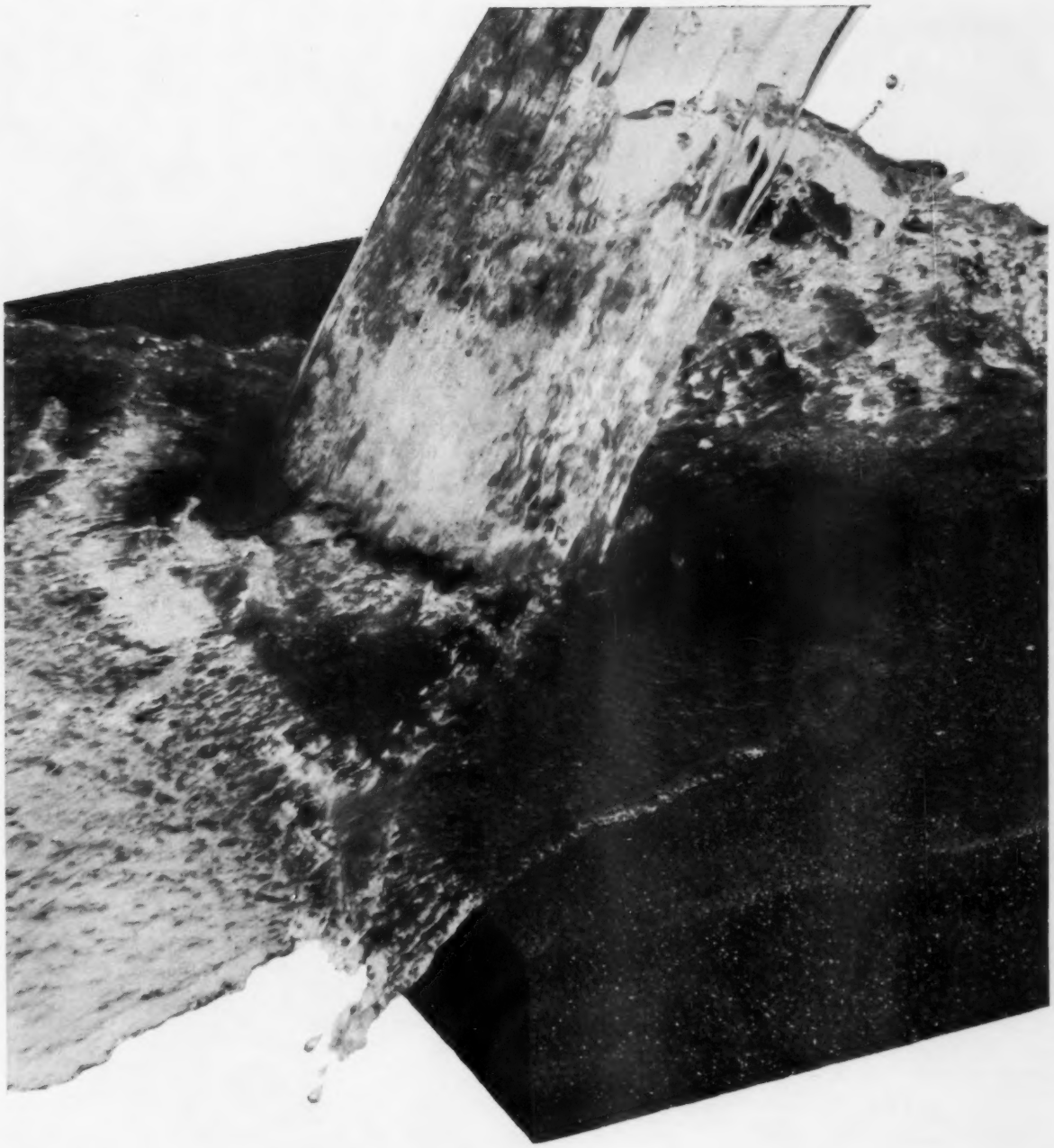
344 Compressor Data—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts, including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Worthington Corp.

345 Air Cooled Compressors—Bulletin AC-15, 16 pp, shows a complete line of small, air-cooled compressors for industrial, and other use. Both one- and two-stage compressors are covered, with working pressures ranging from 85 to 175 psi. Complete specifications for each model are provided. Gardner-Denver Co.

346 Industrial Air Compressors — Twelve-pp Bulletin A-43 describes company's vertical design industrial air compressors supplying moderate amounts of air on a continuous 24-hr heavy-duty basis. Design features are described and illustrated by means of a cutaway view, and specifications and dimensions are tabulated. Joy Mfg. Co.

INSTRUMENTS, CONTROLS

347 Versatile Electronics—How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the



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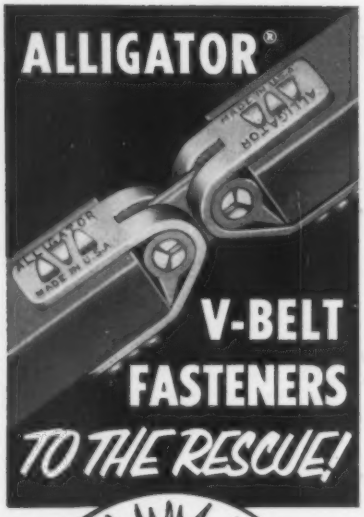

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DATA FILE

(Begins on page 256)

theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give flexibility are described. Minneapolis-Honeywell Regulator Co.

348 Temperature Controls—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating non-indicating controls; thermometers; bulb installation accessories. The Partlow Corp.

349 Gages, Needle Valves—Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. A section on accessories is included, as well as one on specification, covering gage dimensions, dimensional diagrams, dial graduations, and other data. Jas. P. Marsh Corp.

350 For Limited Panel Space—Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale 20 in. long. The Liquidometer Co.

351 Overheat Protection—Bulletin MOPR-1, 8 pp, describes design and operation features of inherent overheat protectors—small devices built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Metals & Controls Corp.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

352 Portable Tools—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metal-working industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection. Skil Corp.

353 Portable Electric Tools — This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. The Black & Decker Mfg. Co.

354 Where to Use Your Stud Driver—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

355 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, price data included. The Ridge Tool Co.

356 Industrial Tools — Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts and tables are designed to aid in tool selection. Armstrong Bros. Tool Co.

357 Industrial Tools—Hand tools and shop tools for production lines, maintenance work and service departments are featured in 108-pp Industrial Catalog 54-1. Loaded with pictures and tool facts, the book describes in detail the complete line of over 4,000 tools—including chests and cabs, wrenches and sockets, screwdrivers, pliers, pulling equipment, tool assortments. Snap-On Tools Corp.

358 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals. Standard Oil Co. (Ind.)

359 Submerged Arc Welder—Design and operation features of a line of submerged arc welders for automatic welding operations are described in 20-pp Bulletin SB-1355. Cutaway views showing component parts are included, as well as photos illustrating typical applications and other details. Attachments for various automatic applications are also covered, and information on adjustments for positioning head, types of available power source, electrodes and fluxes is given. The Lincoln Electric Co.

LUBRICATION

360 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 251 and 252.

361 Lubricant Data Book—Sixteen-pp Lubriplate Data Book No. 57-1, offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants

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(Begins on page 256)

under various conditions given. Lubriplate Div., Fiske Bros. Refining Co.

362 General Lubricant—Technical Bulletin 17 describes an industrial lubricant suitable for lubricating plain bearings, antifriction bearings, linkages, slides, cams and gears. Performance data is given, along with graph showing minimum life expectancy of typical lubricating oils. Sun Oil Co.

363 Fundamentals of Wear—Vol. 42, No. 12 of this company's publication, "Lubrication," provides a 12-pp article on function of lubricants in reduction of wear and friction. Deals with phenomena associated with sliding, basic wear processes, interpretation of lubricant performance. The Texas Co.

364 Lithium Greases—This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of the greases, general application and performance characteristics and includes complete test data. Sinclair Refining Co.

SAFETY, SANITATION

365 Washroom Advisory Service—Form 1367, 34 pp, is an illustrated brochure describing company's washroom advisory service aimed to help in planning of well-designed, easily maintained and properly equipped personal service rooms. Describes basic washroom facilities, combination locker, shower and washrooms, and combination lounge, powder and washrooms. It also features washroom fixtures and towel and tissue supplies. Scott Paper Co.

366 Protective Clothing — Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves and suits and coats are featured, and protective advantages of this equipment are pointed out. The B. F. Goodrich Co.

367 Insect Control—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides detailed. West Disinfecting Co.

ELECTRICAL

368 Totally-Enclosed Motors—Bulletin 500-A describes company's totally-enclosed, fan-cooled motors in ratings from ½ to 40 hp. Ratings and dimensions listed. Robbins & Myers, Inc.

369 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

370 Enclosed Switches—Catalog 83, 28 pp, and Catalog 101, 20 pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

371 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Allen-Bradley Co.

372 Switches, Controls—Publication EA-100, 76 pp, offers quick selection data on manufacturer's line of safety switches, service control, motor control and accessories. Fully illustrated, booklet provides ordering information, brief text on applications, features. Heater coil selection data, and general information. Cutler-Hammer, Inc.

373 Motor Controls—The Controlist, a 16-pp handy reference for motor controls covers a-c magnetic starters, magnetic reduced voltage starters, magnetic part winding starters, magnetic contactors, manual starters, push button stations, a-c and d-c relays, and limit and master switches. Complete specification and price data on the various units in the line are tabulated. The Clark Controller Co.

374 Commutator Maintenance—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them, trouble shooting chart and safety. Further sections deal with resurfacers, brush seaters, commutator cleaner, precision grinders, dust collectors, mica undercutters, armature air gap gages, others. Ideal Industries, Inc.

375 Secondary Unit Substations—Bulletin 9004-A, 20 pp, describes lower cost, complete flexibility and space saving of secondary unit substations. Photos and charts of construction are provided, also standard KVA ratings covering all types of indoor and outdoor substations. I-T-E Circuit Breaker Co.

376 Electrical Equipment Digest—Electrical equipment illustrated and described in 154-pp Catalog Digest 140, includes load centers, circuit breakers, low voltage control, fusible service equipment, interchangeable hubs, meter equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters,

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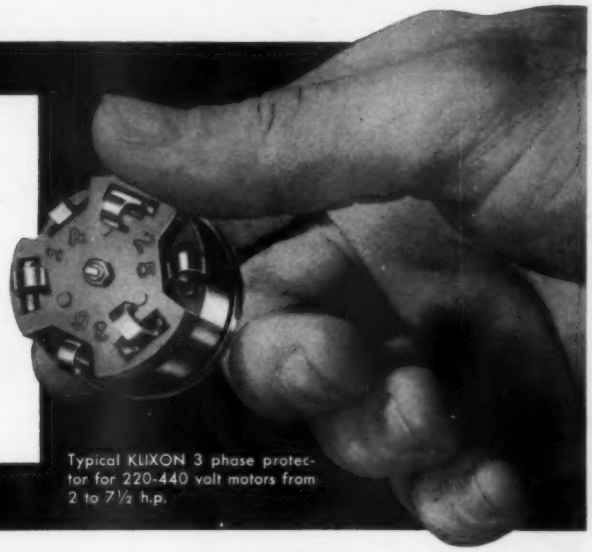

Typical KLIXON 3 phase protector for 220-440 volt motors from 2 to 7½ h.p.

- ELIMINATION OF MOTOR BURNOUTS
- MAXIMUM OUTPUT OF MOTOR UNDER ANY OVERLOAD
- MINIMUM MOTOR REPAIR AND REPLACEMENT
- SIMPLIFIED MOTOR CONTROLS
- LEAST PRODUCTION DOWN TIME
- PROLONGED OVERLOADS
- STALLING
- FAILURE TO START
- LACK OF VENTILATION
- INCREASE IN AMBIENT TEMPERATURES
- PLUGGING OR REVERSING DUTY
- UNBALANCED VOLTAGE

What you expect is not always what you get with conventional motor protection. But with KLIXON inherent overheat motor protection you get a matched combination of motor and protector — either single phase or three phase — tested and installed by the motor manufacturer.

You know you're getting the best possible protection against overheated motors caused by:

Today more and more manufacturers are using motors protected with KLIXON Inherent Overheat Protectors.

Be sure you get everything you expect from motor protection too — specify KLIXON protectors when you order motors. For full information, check with your motor suppliers district office or write us.

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DATA FILE

(Begins on page 256)

magnetic breaks, relays, contractors other equipment. Square D Co.

377 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting. Feedrail Corp.

378 Plug-In Duct—Advantages of company's plug-in bus duct are detailed in 24-pp Bulletin 300. In addition to descriptions and illustrations of various design and installation features, it includes specifications, curves plotting characteristics, and dimensional data. Products Div., Borg-Warner Corp.

379 Conductor Systems—This 36-pp catalog describes the Insul-8-Bar systems of mobile safety electrification for cranes, monorails and moving machinery. Includes photos and descriptions of typical installations, engineering data, installation procedure, a photo-text list of all catalog items that comprise these enclosed conductor systems. Catalog also explains how low cost safety is made possible by their simplicity. Insul-8-Corp.

380 Wires and Cables—Interlocked armored cable, supports and fittings designed for low cost, heavy duty industrial, power or control wiring are described in this 24-pp bulletin. Photos and specific descriptions of various types of armored cables available for voltages through 15,000 v, single and multi-conductor are included. Arranged in table form are dimensional data. National Electric Products Corp.

381 Power Lighting Cable—Bulletin RR-10 describes company's Type RR-10 cable for power and lighting service. Technical characteristics of direct buried, aerial or conduit installations and sheaths are included, as well as tabular data giving physical dimensions. Triangle Conduit Co., Inc.

382 Hydraulic-Magnetic Breakers—Bulletin 301, 16 pp, describes advantages and operation of company's hydraulic-magnetic circuit breakers. Design and construction features are detailed and time-delay curves, specifications and dimensional data included. It also gives ratings in amperes and contains a condensed guide to standard circuit breaker models and available features. Heinemann Electric Co.

383 Cathodic Protection Cable—Two kinds of cathodic protection cables are described in this informative bulletin. Special advantages of each are listed, and applications and specifications are given. General Cable Corp.

384 Electrical Wires, Cable—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages of the products are detailed, a table of insulations furnished, and design and construction features illustrated. The Okonite Co.

385 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special fastening devices to save time and labor. Contains full instructions for installations, load charts. The Globe Co.

386 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, mechanical moisture absorption, electrical moisture absorption, capacity and power factor. Anaconda Wire & Cable Co.

387 Testing Instruments—Bulletin 19-56, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features, operating ranges, and suggested applications. James G. Biddle Co.

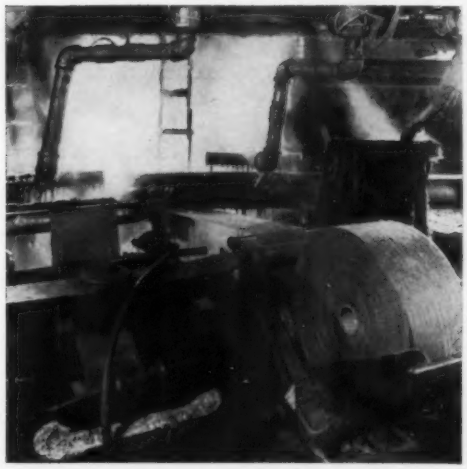
388 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3 includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

389 Asbestos Insulation—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Rockbestos Products Corp.

390 Flexible Cords—This well illustrated 24-pp booklet includes all new Underwriters classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on selection. Whitney Blake Co.

391 Protective Equipment Guide—Form SPD 56 is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1956 National Electrical Code. Besides providing suggestions on how to select right kind of protection, booklet provides wiring diagrams, motor tables, volt loss tables, others. Also shows switch size to use when fuse, Fusetron dual-element fuses or Fustat is installed. Bussman Mfg. Co.

An 8" steel pipeline carries thousands of gallons of water daily to flumes, washers and coolers in this Libby, McNeill & Libby cannery. Working around the clock in season, the plant must have a dependable water supply. So L·O·F Glass Fibers' Blue Flag Pipe Wrap and Duratape Joint Wrap protect the line against possible failure due to underground corrosion.



The pipe for this important installation was "yard-wrapped" by Hill-Hubbell and Co., Cleveland. As specified, they used L·O·F Glass Fibers' Blue Flag to help guard the pipe against underground corrosion.

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DATA FILE

(Begins on page 256)

LIGHTING, COMMUNICATION

392 Architectural Floodlighting—Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces. General Electric Co.

393 Emergency Lighting—Publication 243A, 20 pp, describes various aspects of emergency lighting and features a system designed to provide automatic and instantaneous emergency lighting in event of a power interruption. Components of system are individually treated, and capacities, ratings, specifications are included, along with wiring diagrams, descriptions of fixtures and accessories, and illuminated exit signs. The Standard Electric Time Co.

394 Lamps for Industry—Eight-pp Bulletin 66 presents manufacturer's line of lamps for industrial service, indoors and outdoors. These include mercury vapor lamps, weatherproof floodlights, high bay reflector lamps, spotlights, infra-red lamps, spatterproof lamps, and others. Illustrated with photos, curves indicating candlepower, brief text covers features and applications. Radiant Lamp Corp.

395 Industrial Fluorescent Lighting—Design and construction features of industrial fluorescent lighting equipment are illustrated and described in 36-pp Bulletin b. Advantages of the equipment are detailed and complete specifications included, along with data on methods of suspension, power consumption table, dimensions, accessories and tables of coefficients of utilization. Benjamin Electric Mfg. Co.

396 Industrial Lighting—Designed to be inserted in company's lighting catalog, these two data sheets describe application, construction, installation and wiring details of two types of lighting units. Section 30, Sheet 20 features all-porcelain industrial units and Section 30 Sheet 19 covers vapor-tight units. Day-Brite Lighting, Inc.

397 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. A chapter on interior lighting design describes ways of calculating quantity of light. Westinghouse Electric Corp.

398 Lighting Unit Specifications—The current edition of the "RLM Standard Specifications of Industrial Lighting Units" contains important revisions in specifications on both incandescent and fluorescent units, as well as new lighting data. Of special importance are new coefficient of utilization tables for eight units. Calculations are based on latest zonal method of computing coefficients of utilization and illumination on room surfaces. RLM Standards Institute.

399 Lighting Equipment—Bulletin 2697, 52 pp, contains detailed information on a line of lighting equipment, including floodlights, searchlights, industrial lighting and fixture condulets. Two new items—mercury vapor floodlights and vapor master lighting fixtures—are also covered. Description of each item is given along with list price. Crouse-Hinds Co.

400 New Light Source—Long life, brilliance, and other advantages of the Fluomeric Lamp which lights without a ballast are presented in illustrated Form 579. Cutaway diagram illustrates component parts and operation principle. Duro-Test Corp.

401 Signal Equipment—Tips on how to select suitable signals for any specific operations are offered in Bulletin 100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

MATERIALS HANDLING

403 For Overhead Handling—Booklet 2008-M, 12pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing

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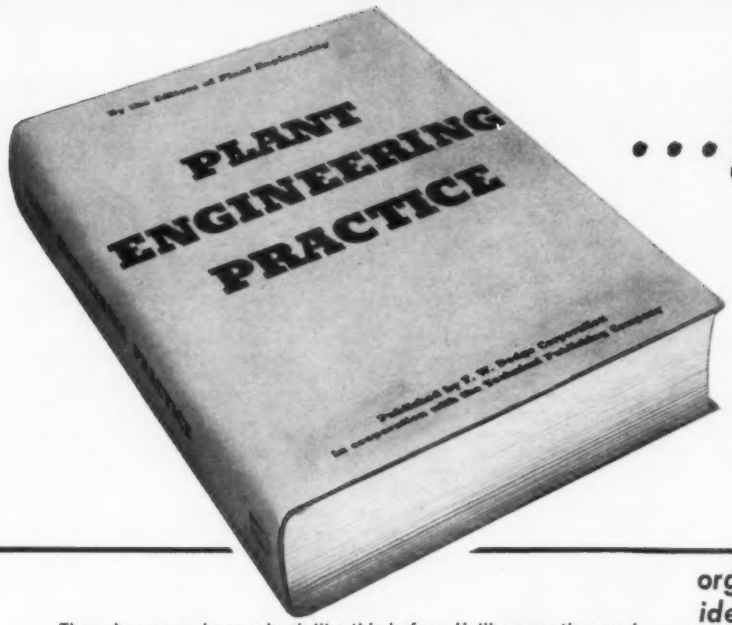

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industrial rail systems, conveyors, cranes, fork lifts, cranes, tractor-powered rail systems.

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8. ELECTRIC POWER
dry and oil type transformers, electric motors, other electrical equipment, also installation and selection of ground systems, capacitors, and electric safety precautions and procedures.

9. LIGHTING
emergency installations, mercury, fluorescent, and incandescent systems, maintenance and installation of high ceiling fixtures, including use of overhead cars.

10. UTILITIES
power cable placement, intercoms, water softening, cafeteria design and maintenance, control of drinking water purity, recovery of industrial wastes, handling radioactive byproducts.

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control against dust, heat, steam, odor, insects, radiation; installation and maintenance of fuel tanks, condensers, hot-water systems, oil burners and cooling systems.

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instrumentation, functions of instruments, dial gauges, use of isotopes and x-ray for quality control.

13. SHOPWORK
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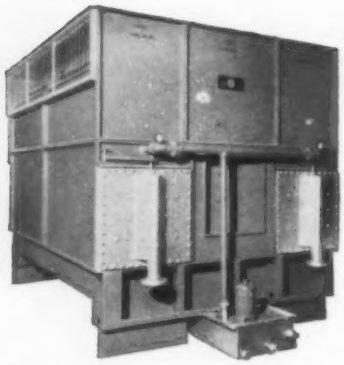

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DATA FILE

(Begins on page 256)

various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes, and transfer cranes. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

404 Overhead Handling Systems—This 8-pp catalog pictures and describes a line of overhead handling equipment and details advantages of overhead handling systems for various industrial operations. Typical applications are pictured and described. The American Monorail Co.

405 Steel Conveyor Belts—"A profitable aproach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

406 Engineered Conveyor Systems—Catalog 835, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyor Co.

407 Dragline Conveyors—Catalog 157, 48 pp, describes Towveyors (chain-in-floor) and overhead tow conveyors for towing carts around warehouses, other areas. Contains engineering information, dimensions and cross-sections of component parts, installation data of assistance to those making their own installations, layouts and pictures of systems in various industries. Advantages of Towveyors and overhead tow conveyors are detailed. Jervis B. Webb Co.

408 How to Choose a Crane—Designed to aid in the selection of overhead cranes, 8-pp Unit 79 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley, hoist. Whiting Corp.

409 Chain Hoists—Catalog 61, 20 pp, describes construction and design features of company's multiple gear chain hoists, with a large cutaway view showing component parts included. A table of dimensions is given, as well as dimensional diagrams, shipping information, parts list prices and other pertinent data. Reading Crane & Hoist Corp.

410 On Chain Block Safety—This wall chart illustrates safe handling of chain blocks. Sketches cover nine principles of handling, showing what should always be done and what should never be done. Reverse side of the chart gives data on company's line of chain blocks and trolleys. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

411 Overhead Cranes—Bulletin HD-1000, 12 pp, contains detailed information on heavy double girder overhead cranes designed to serve a variety of industrial handling needs. Photos of typical installations are included. Industrial Crane & Hoist, Ingersoll Products Div., Borg-Warner Corp.

412 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

413 Rugged Little Hoist—Twelve-pp Bulletin 158-E describes the Lodestar, a light weight but heavy duty, small electric hoist with push button control. Discusses low maintenance, safety, other advantages offered, and covers design features. Specifications and dimensions are given for both single- and double-chain models and accessories are illustrated. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

414 Self-Dumping Hoppers—Bulletin 255 describes self-dumping hoppers reported to cut cost of hand unloading at least 50 per cent. Details rugged construction of the units, safety catch incorporated, other features. Standard models are pictured, as are some typical jobs handled. Roura Iron Works.

415 Automatic Bulk Handling—Bulletin 530, 32 pp, on Airstream con-

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(Begins on page 256)

veyors, presents information showing how pneumatic conveying has solved many bulk handling problems. System diagrams of typical installations point out applications and flexibility of conveyors. Over 70 illustrations show how air transports granular or powdered bulk material. Dracco Corp.

416 For Bulk Materials—Latest information on equipment for storing and handling bulk materials is contained in 12-pp Bulletins 574. Descriptions, specifications and dimensions of vertical and horizontal tanks are included. Cost savings afforded by bulk storage and handling facilities noted. The Day Co.

417 Sheet and Coil Lifters—Bulletin SL-30, 16 pp, illustrates and describes various types of standard and semi-special lifters for one-man or automatic handling of sheet and coil stock. Advantages and design features are detailed and tables listing dimensions included. Cullen-Friestedt Co.

418 Cost-Cutting Materials Handling—"The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet covering various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices, analysis of handling organization, collecting handling data, diagramming travel. The Yale & Towne Mfg. Co.

419 Oil-Hydraulic Lifts—Catalog RE-203, 20-pp, covers the field of heavy-duty, oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank. Rotary Lift Co.

420 Casters and Wheels—This 192-pp manual, Number 60, contains detailed information on a line of casters and wheels designed for a variety of furniture and equipment applications. Dimensional data, specifications and price lists are provided for furniture and industrial casters and wheels, and photos, drawings and diagrams illustrating design and construction features are included. Darnell Corp.

421 Casters and Wheels—Catalog 125, 56 pp, includes helpful hints on selecting casters and wheels for many applications. Gives specifications on a line of casters, including forged steel, plate steel, cast steel, pressed steel and semi-steel in hundreds of styles and sizes, both swivel and rigid. Indexed for handy reference, also covers wheels, including steel, semi-steel, ductile iron, molded-on rubber-tired, renewable rubber tires, pneumatics, others. The Hamilton Caster & Mfg. Co.

422 Drop Forged Caster—Bulletin 7557 contains specification data on a line of drop forged steel heavy duty casters. Features of design and construction are illustrated and described. Faultless Caster Corp.

423 Parts Handling Baskets—Eight-pp Bulletin MS-57 describes a wide range of wire parts-handling baskets for conveying and processing production parts. Also covered are conveyor hooks, plating racks and many special purpose materials handling items, as well as wire machinery guards, conveyor catch guards and other safety products. Wire & Iron Products, Inc.

SLINGS, CHAINS, WIRE ROPE

424 Wire Rope Manual—"Inspection of Wire Rope," "Methods of Lubricating Wire Rope," "Use and Abuse of Wire Rope," and "Sheave Maintenance" are a few of many subjects covered in this 188-pp Wire Rope Manual, Catalog G-16. In addition, there are sections devoted to strengths and weights of wire rope, cable assemblies, and rated capacity of slings. A complete reference guide on care and use of wire rope and slings, Manual is in handbook size and tab indexed. Available to qualified plant engineers, please state your job title when requesting this. Macwhyte Co.

425 Wire Rope Cost Control—The Service-Score System for controlling wire rope costs is the subject of this illustrated folder. Described is an easy method of fact-finding to increase wire rope operating efficiency and help reduce supply and maintenance costs.

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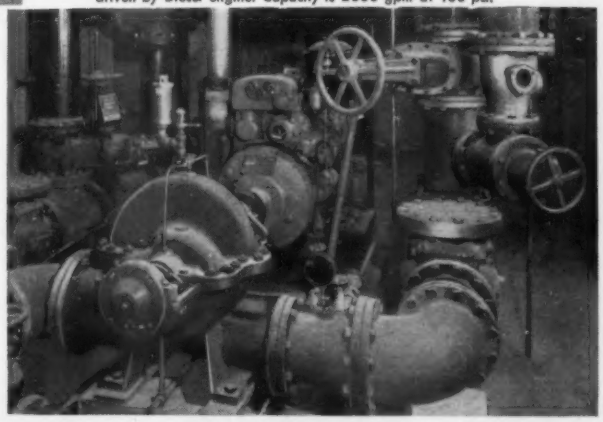

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

For more facts circle 676 on Reply Card

Garland RAWHIDE HAMMERS and MALLETS

A REAL BUY!

Prices Haven't Changed SINCE 1951

FOR PRECISION STRIKING

NO BOUNCE-BACK — Rawhide makes a solid impact. Light blow . . . heavy blow, there's no rebound to impair efficiency.

NO SCAR-DENT-MAR — Garland hammers can be used with complete safety on steel, iron, brass or soft aluminum. Cuts down costly scrap and rejects.

TEMPERATURE EXTREMES NO PROBLEM! — Unlike many "soft face" hammers, Garland rawhide faces are temperature stabilized. Others become brittle and break in extreme cold . . . burn up in extreme heat. But Garland rawhide hammers remain in perfect condition despite extreme heat or cold.

Garland products are backed by 90 years experience with rawhide . . . add skill to the hand of industry. Complete line of hammers and mallets for precision striking.

Garland MANUFACTURING CO.

Manufacturers of Rawhide Loom Pickers • Sponge Leather Bunters • Rawhide Hammers and Mallets

101 WATER STREET • SACO, MAINE

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SAFETY FIRST and savings, too!

with INSUL-8-BAR® SYSTEMS

Mobile Safety Electrification for Cranes, Monorails, All Moving Machinery.

These are the only enclosed conductor systems that meet *all* requirements of mobile safety electrification. Standard catalog parts eliminate the need for special engineering. Installation is fast, maintenance easy. Investigate today!

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Rush catalog re Insul-8-Bar mobile electrification.

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ADDRESS_____

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READING ELECTRIC HOISTS

● Ohio Crankshaft's Tocco Division plant is meeting higher production goals with help from Reading Electric Hoists. The new plant was designed with a Reading Hoist "custom-built" into the plans. Write for our latest bulletin "The Why and How of Faster Production".

READING CRANE & HOIST CORP.

CHAIN HOISTS • OVERHEAD TRAVELING CRANES • ELECTRIC HOISTS

2101 ADAMS ST., READING, PA.

For more facts circle 679 on Reply Card

DATA FILE

(Begins on page 256)

Sample set of service-score stickers are included. Leschen Wire Rope Div., H. K. Porter Co., Inc.

426 Sling Handbook—The 64-pp Tuffy Sling Handbook is replete with illustrations, charts and diagrams describing 16 factory fitted slings and nearly two dozen standard fittings available for slings, including several which are recent additions to the line. Book contains a complete rigger's manual, shop chart of ratings, an engineer's notebook and standard signals for directing operations of overhead traveling cranes. Union Wire Rope Corp.

427 Sling Chains—Properties and capabilities of company's registered sling chains are fully discussed in Bulletin DH-101. Featured is a listing of the 7 points to consider when ordering sling chains, and a chart giving working load limits of 2-leg chains. American Chain Div., American Chain & Cable Co., Inc.

MAINTENANCE

428 Basic-Roofing Information "What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

429 Handbook on Coatings — This 1958 Coatings Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Illustrated in full color, this book contains information and recommendations to enable accurate determination of specific coatings needed for the job. Basic principle of Rust-Oleum's fish oil penetration into pores of metal is illustrated. Application photos give new ideas for protecting girders, tanks, boilers, roofs, other surfaces. Contains 100 color chips. Rust-Oleum Corp.

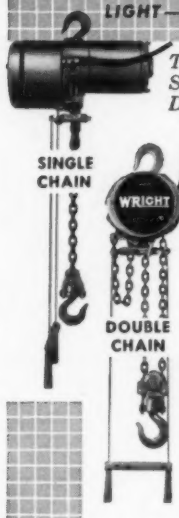
430 Protective Coatings — Corrosion control in the operating plant is the subject of this bulletin, which outlines several corrosion-resistant coatings systems for buildings and equipment, structural steel, towers and columns, tanks and piping. Properties and uses are given. Amercoat Corp.

431 Tough Floor Topping—Chemi-Top, a corrosion resistant floor topping for food processing, chemical and other plants having severe floor corrosion problems, is discussed in 8-pp Form A515R. What Chemi-Top is, and what it can do, are explained. Two basic formulations and three service types are covered, also a non-skid type of floor topping for maximum slip resistance. The Garland Co.

432 Light Scaffolds — This series of illustrated bulletins describes company's line of aluminum alloy Up-Right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability.

NEW WRIGHT Electric Chain Hoists

LIGHT—COMPACT—RUGGED—LOW COST



Two capacity ranges as pictured—
Single Chain 300 to 2000 lbs.
Double Chain 3000 to 4000 lbs.

Long Life • Safety • Minimum Maintenance are assured by these sound features:—Wick Oiling of Load Chain gives a working life many times greater than dry chain ...Fewest Moving Parts of any chain-type electric hoist cuts maintenance...Alloy Steel Load Chain is heat-treated for long-wearing surface, with ductile core to resist shock loads—side-pull won't break this flexible chain...Load Wheel Hooks and Hook Couplings are drop-forged alloy steel...Worm and Gear Drives serve as simple, positive Load Brake, and there's a big, efficient Motor Brake, easy to adjust for lining wear. For complete information, write York, Pa., for **Bulletin DH-73.**

Wright Hoist Division
AMERICAN CHAIN & CABLE

ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 680 on Reply Card

Aget offers more! Over 38 standard Dustkop models to choose from . . . *Plus* engineering service to help you select, provide, and install the proper accessories and fittings to complete your dust collecting system. Write for illustrated folder . . . Today!

AGET MANUFACTURING COMPANY
1388 E. CHURCH STREET • ADRIAN, MICHIGAN

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from INFILCO, leaders in liquid treating equipment

DELIVERS CLEANER COOLANT, DRIER SWARF

REDUCES NUISANCE and COSTS of SUMP CLEANING

IMPROVES WORK QUALITY and PRODUCTION

LESSENS RANCIDITY, HELPS CONTROL DERMATITIS

The INFILCO coolant separator for ferrous metal working is equipped with new type permanent magnets in a liquid tight, non-corrosive drum. It provides more efficient cleaning of soluble oils, chemical coolants and mineral cutting oils. This trouble free equipment meets the demands of today's production line standards. "Timed cycle" operation controls the formation of magnetic brush for maximum removal of contaminants by straining and combing the coolant flow. Solids removed are delivered dry for easy disposal.

The Magnetic Separator is part of the complete INFILCO line of automatic equipment for cleaning, disposal or reclamation of industrial liquids. Capacities from 1 to 2000 gpm.

INFILCO
INCORPORATED
TUCSON, ARIZONA

Please send BULLETIN 9000 ☐

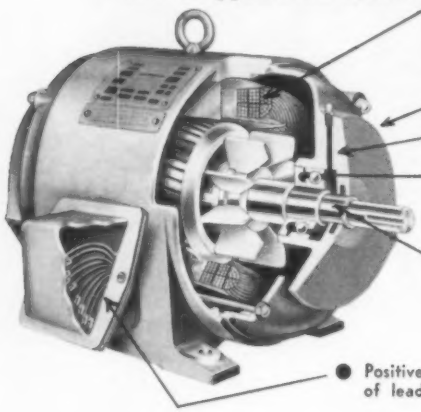
NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____
Ferrous ☐ Non-Ferrous ☐ Coolant ☐ Cutting Oil ☐

INFILCO Inc. Dept. PE Tucson, Ariz.

For more facts circle 682 on Reply Card

STAMINA of BROOK A.C. MOTORS is no coincidence!

Design is based on over half a century of experience. Built to surpass NEMA Specifications, yet cost no more than ordinary motors. Single and polyphase. All major types. 1 to 600 HP. Shipped from stock.



- Long-life windings are triple impregnated and baked.
- Internally-ribbed, shock resistant iron frame.
- Generous bearing lubrication capacity.
- Bearings two sizes larger than customary; yet, still replaceable from any standard bearing stock.
- High tensile steel, precision ground shaft and balanced rotor assembly.
- Positive identification of leads.

SINCE 1904

BROOK MOTOR CORPORATION

world's most respected motor

BROOK MOTOR CORPORATION

3553 W. PETERSON AVE., CHICAGO 45, ILLINOIS

Factory Representative, Warehouses, Dealers, Service Stations, in Major Cities.

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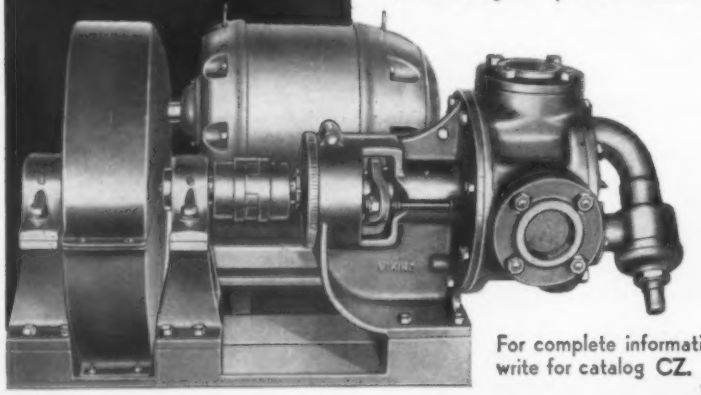
for **RUGGED PUMPING**

Specify **VIKING** Heavy Duty **PUMPS**

When jobs require rugged pumping, you can depend upon Viking Pumps. All are fast self-priming and positive in action. Models are built to handle liquids ranging from LP-Gas up to those of a viscosity of 2,500,000 SSU.

Choose yours in sizes of 10, 20, 35, 50, 90, 150, 200, 300, 450, 750 and 1050 G.P.M. Suitable for pressures to 200 psi on lubricating liquids, or 100 psi on non-lubricating liquids. Built of many types of metals and combinations of metals. Available in any type of mounting and power desired.



For complete information, write for catalog CZ.

VIKING PUMP COMPANY

Cedar Falls, Iowa, U.S.A. In Canada, it's "***ROTO-KING***" pumps

See Our Catalog in Sweet's Plant Engineers File.

For more facts circle 684 on Reply Card

DATA FILE

(Begins on page 256)

Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

433 For Maintenance, Sanitation — This 44-pp catalog contains information on sanitation and maintenance products for industrial and other buildings. Products are placed in separate division for easy selection, with descriptive copy telling what product does, how it works, where it may be used to best advantage. Index lists floor maintenance products, soaps, germicides, insecticides, cleaning compounds, as well as soap dispensing equipment, floor machines. Huntington Laboratories, Inc.

434 Vacuum Units — This bulletin describes heavy-duty, portable vacuum units designed for a variety of plant housekeeping jobs. Application in removing litter, conveying or reclaiming materials, and collecting hazardous matter is covered. Invincible Vacuum Cleaner Mfg. Co.

CONSTRUCTION

435 Aluminum Building Products — Form AD 285 is a 32-p catalog covering company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and roughing-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. Aluminum Co. of America.

436 Fir Plywood—This 34-pp construction guide contains full-page structural drawings providing basic information on types, grades, and applications of fir plywood. Booklet covers information on floor construction, single and double wall construction, and roof construction. It is designed for maximum simplicity of use and quick reference, bound in notebook form. Douglas Fir Plywood Association.

On pages 251-252 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

437 Panel Wall Construction — The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q35-55. Includes installation photos, diagrams, specifications, as well as drawings pointing out structural details. H. H. Robertson Co.

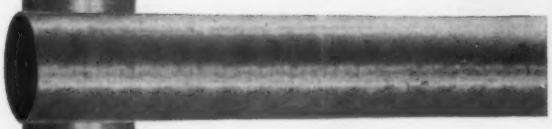
438 Functional Glass — Advantages of company's rolled, figured and wired glass for vertical sidewall and skylight glazing are detailed in Catalog 58-G,

BONDSTRAND®

fiber-glass reinforced epoxy pipe by Amercoat®

...strong as steel pipe, only ⅛ the weight. Tensile: hoop 80,000 psi, longitudinal 40,000. Highly corrosion resistant. Won't scale, cold flow or deform. 20-ft. lengths easy to cut and join. Fittings available.

DIAMETERS 2 TO 12 INCHES... TO 40 INCHES ON SPECIAL ORDER



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Amercoat® CORPORATION

4809 Firestone Blvd., South Gate, Calif. Dept. LB 1108

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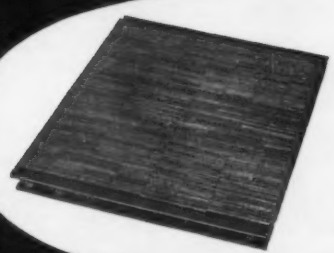
NEW! FLEX-O RUBBER FLOOR PADS

...Cut Product damage ...reduce floor Maintenance costs



■ Now you can protect dropped products and floors with low cost FLEX-O floor pads. Built for heavy duty service, they are made with steel channel frames and laminated segments of resilient rubber reinforced fabric. They are available in two standard sizes for use on the floor and for recessing into specially built floor pockets.

Write for detailed literature.

BUMPERS, INC.

Subsidiary of Rowe Methods, Inc.

2534-F Detroit Ave. • Cleveland 13, O.

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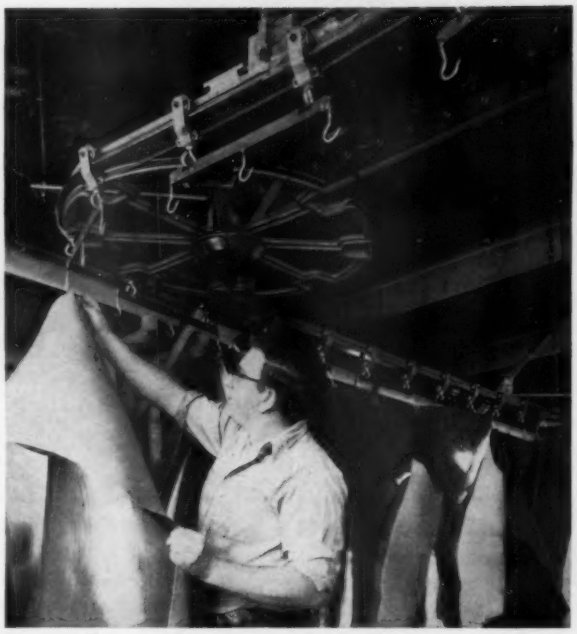
COBURN

OVERHEAD CONVEYING SYSTEMS



...for low-cost, easy installation

Coburn makes a complete line of overhead conveying equipment adaptable to any plant or type of material handling operation. Coburn systems are inexpensive —can be installed by plant personnel.

Coburn Overhead Conveying Systems give you these features:

FLEXIBILITY—sectionally designed equipment makes it easy to enlarge or modify existing systems.

MINIMUM HEADROOM REQUIREMENTS—they simplify the spotting of work directly over machines.

PAY FOR THEMSELVES QUICKLY—through low initial cost, increased labor efficiency, and speed-up of handling materials. You get further savings because Coburn's rugged high quality keeps repair and replacement costs to a minimum.

Coburn also makes a complete line of sliding door and fire door hardware. For detailed information on any Coburn product, contact the nearest sales office listed below.

Atlanta • Boston • Buffalo • Chicago
Detroit • New Orleans • New York • Philadelphia

5705

CF&I **COBURN PRODUCTS**

PRODUCTS OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

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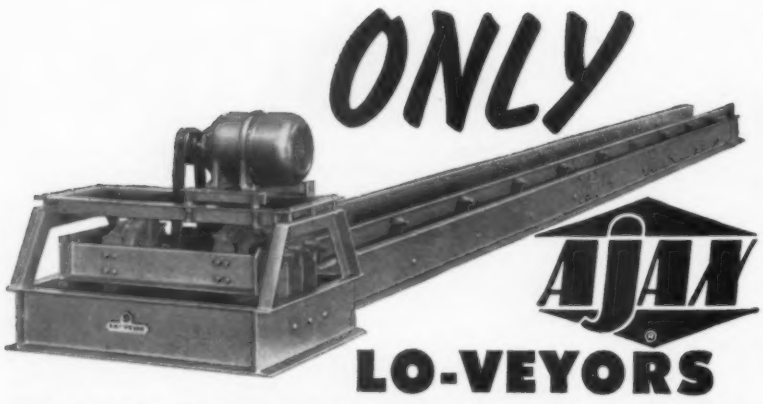

GIVE YOU THE LOW COST PERFORMANCE MADE POSSIBLE BY THE AJAX RECIPROCATING DRIVE

Ajax Lo-Veyor performance is built around its exclusive reciprocating drive. It is a self-contained unit housing two gear driven weights rotating in opposite directions, which impart reciprocating action in automatic balance. The drive mechanism runs on anti-friction bearings in an oil tight housing — which keeps lubrication in and abrasive dirt out. Lo-Veyors are available in open and closed pan or tubular types. Write for catalog.

Showing Ajax Reciprocating Drive Unit. Smooth operation permits installation without heavy anchorage to building.

AJAX FLEXIBLE COUPLING CO. INC.
WESTFIELD, N. Y.

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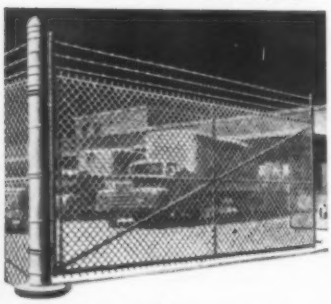
PAGE chain link FENCE

America's First Wire Fence—since 1883



LASTS LONGER—COSTS NO MORE

It's *Aluminized!*

• Here's important, money-saving news *for you*. By a patented process Page is producing a *great new wire* which provides better, longer-lasting fence protection at a substantial long-range saving. Commercially pure aluminum is bonded to fence fabric wire and thus combines the strength of steel with the corrosion resistance of aluminum. ASTM salt spray tests show that for equal thickness of coating, the new aluminized wire outlasts galvanized wire by more than 2 to 1, yet with all the advantages of this *new* fence fabric it costs no more to buy and install a Page Chain Link Fence with ACCO Aluminized Fabric. In terms of years of unfailing service your investment can be halved or more. And to be sure of expert, reliable workmanship your fence will be engineered and erected by a nearby, long-experienced member of Page Fence Association. For helpful Page data...

Write to PAGE FENCE ASSOCIATION, Dept. PE, Monessen, Pa., Atlanta, Bridgeport, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia or San Francisco.

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.

For more facts circle 689 on Reply Card

DATA FILE

(Begins on page 256)

20 pp. Describes types suited for commercial, institutional, industrial applications. Provides transmission data, light distribution properties, photos of patterns. Sections are devoted to types primarily for decoration, for protection, for heat absorption. Mississippi Glass Co.

439 Steel Floor Plate — Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. United States Steel Corp.

441 Non-Slip Flooring — Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, and includes information on fabricating. Alan Wood Steel Co.

442 Roofing and Siding Data—This folder contains Bulletins 2032, 2032A, B, C and D on corrugated Asbestone roofing and siding, stud weld fasteners, staggered joint application and straight joint application. Includes specifications, as well as photos and dimensional drawings showing construction details. National Gypsum Co.

443 Replacement Glazing — Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

444 Grating and Treads—Bulletin 2527 is a 26-pp, illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electro-forged, riveted, rectangular, diagonal, U-Type and T interlocked grating and treads. Tables of safe loads and information on specifying are also included, as well as photos of typical applications. Blaw-Knox Co.

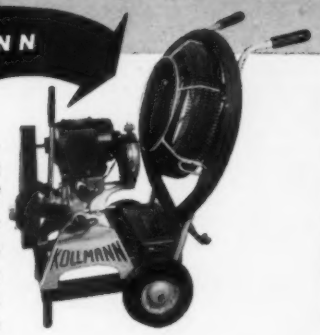
445 Rubber Dock Bumpers—This catalog sheet illustrates and describes company's line of Flex-O Rubber dock bumpers, designed to protect docks and trucks, reduce damage to fragile freight, and eliminate dock maintenance and prevent dock downtime, by absorbing impact of trucks backing into docks. Detailed specifications are included. Bumpers, Inc.

INSULATION

446 Insulation Specifications — This set of six specifications covers application of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thicknesses of insulation to be applied, drawings of installation procedure, supports, and recommended finishes. Booklets are devoted to low-, medium-, high-, and dual-temperature equipment and piping, to underground piping, and spheres. Pittsburgh Corning Corp.

Open plugged drains and supply lines *FASTER, BETTER*

with a KOLLMANN K-500



● Designed for industrial use, the K-500 makes fast work of stubborn flow line stoppages, eliminates trouble and "down time" . . . and anyone in the maintenance crew can operate it. The dolly-mounted K-500 handles up to 200′ of sectional cable (400′ with larger power units) for full-diameter cleaning of lines 3″ to 10″. Interchangeable clutch jaws quickly adapt it to lines as small as 1¼″. *Every* maintenance department can readily justify this machine . . . it will pay for itself many times over.

See the full Kollmann line at your distributor, or write for literature

KOLLMANN MANUFACTURING COMPANY
4861 PEACH STREET • ERIE, PENNSYLVANIA

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READY NOW!
. . . from Hamilton

HELPFUL NEW BUYER'S GUIDE FOR MEN WHO SPECIFY INDUSTRIAL CASTERS AND WHEELS . . . MAIL COUPON TODAY!

THE HAMILTON CASTER & MFG. CO.
1771 Dixie Highway • Hamilton, Ohio
YOUR NEW CASTER CATALOG, PLEASE.

NAME_____
CO._____
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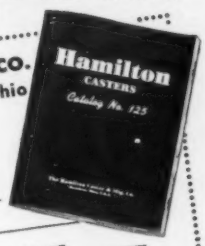

Hundreds of casters and wheels for every industrial requirement are clearly illustrated and described in this big, new Hamilton Catalog. Swivel and rigid casters of forged steel, plate steel, cast steel, pressed steel and semi-steel. Single and double-wheel models. Wheels—of steel, semi-steel, hard rubber, molded plastic. Rubber tires—pneumatic, mold-on solid, semi-pneumatic, renewable. Special rubber—Neoprene, Novite, static conductive. Flanged track wheels, V-grooved wheels, cart wheels. Bearings include—ball bearings, Hyatt bearings, Timken bearings, Oilite bearings. Lifetime bearing seals. Capacities range up to 5000 lbs. per caster. *Write today.*

1907 • SERVING INDUSTRY FOR 51 YEARS • 1958

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"efficiency-engineered!"

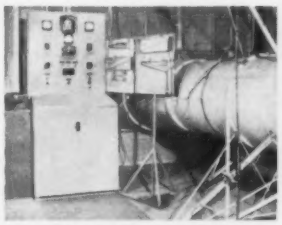
what does this mean to YOU?

IT MEANS AEROVENT FANS ARE INDIVIDUALLY "JOB-TESTED" FOR PERFORMANCE AND RATING!

One of the most complete facilities in the United States for scientific air-moving research is maintained by Aerovent.

In addition to ceaseless experimental work, this up-to-the-minute engineering laboratory, with the aid of the world's largest test chamber (wind tunnel), tests Aerovent units under simulated operating conditions. Typical resistances which may be encountered in actual operation are applied to each unit, to assure satisfactory performance and economy in every industrial application.

Write for free Engineering Bulletin E-57



CONTROL BOARD
for observing and recording operating characteristics of fans being tested in chamber shown at top.

OUTDOOR LABORATORY
for confirming of wind tunnel tests and performance data, and conducting endurance test programs.

Aerovent builds fans for every type of industrial application, in sizes from 9″ to 96″, and capacities to 145,000 CFM. Large propellers for cooling towers and heat exchangers in diameters to 18 feet.

WORLD'S LARGEST exclusive manufacturers of industrial air-moving equipment!

Aerovent

Rated in accordance with Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

Certified Ratings

Aerovent FAN CO. INC.

Ash and Bond Sts. Piqua, Ohio

For more facts circle 692 on Reply Card

Aftercooler and Cyclone Separator designed for cleaner, dryer compressed air

R. P. ADAMS CO., INC.
254 East Park Drive, Buffalo 17, New York

The Adams Aftercooler and Cyclone Separator are designed to efficiently condense and remove water from compressed air and process gas. Condensed moisture and entrained dirt and oil are subsequently removed in a cyclone type separator. This unit is scientifically designed for maximum removal efficiency over a wide range of flow rates.

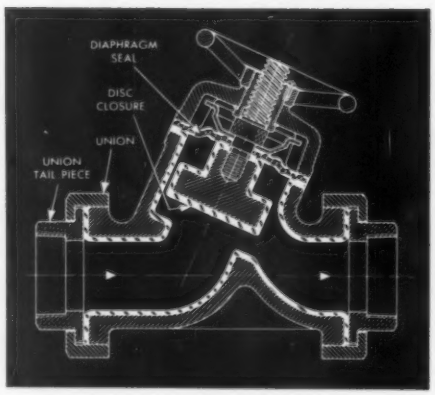
For normal use, units are available to cool gases to within 10° F of the temperature of the cooling water. Specially designed units are available to permit a 2° F approach to cooling water temperature, for application where low moisture content is critical.

Adams Aftercoolers and Separators are available from stock to handle 20 - 40,000 cfm with 10° cooling and 25 - 19,200 cfm where it is necessary to cool within 2°F of the cooling water. Special units can be supplied to suit an unlimited range of requirements. In all cases the maximum pressure loss at rated capacities is ½ psi.

This wide range of sizes enables the economical utilization of Adams Aftercoolers and Separators in virtually all industrial application. For further information on how R. P. Adams' units will solve your compressed air problems and save you money, write today for Bulletin 711.

For more facts circle 693 on Reply Card

3 BIG ADVANTAGES in ROCKWELL "D—D" DIAPHRAGM VALVE



1 DIAPHRAGM FOR POSITIVE SEAL, fully supported, longer wearing. No packing gland to leak.

2 DISC FOR POSITIVE CLOSURE absorbs action and pressure of fluid; valve can be closed tight even if diaphragm fails; requires lower closing torque.

3 UNION ENDS ideal where replacement or inspection must be frequent. Saves on companion flanges, gaskets, bolts, alignment, labor, etc.

as well as

Oversized ports—high capacity; lower handwheel torque and fewer turns to close; lower thrust for automatic operation; body of any metal or lined with rubber or plastics.

Write for Bulletin 800.

W. S. ROCKWELL COMPANY
2928 ELIOT STREET • FAIRFIELD, CONN.
Sales Representatives in Principal Cities

For more facts circle 694 on Reply Card

DATA FILE

(Begins on page 256)

447 Piping Insulation — Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping where maximum efficiency is of importance and for hot water and low pressure steam. Gustin-Bacon Mfg. Co.

448 Glass Fiber Insulation—Among the company's products described in this illustrated bulletin are three kinds of flame-blown glass fiber insulations used for thermal and acoustical applications. Charts are included illustrating the acoustical and thermal values of the insulating blankets. L. O. F. Glass Fibers Co.

SPACE, PROCESS HEATING

449 Plumbing, Heating Supplies — Edison H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and illustrated, the catalog gives detailed information on sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

450 On Unit Heaters—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories. American Air Filter Co., Inc.

451 Unit Heaters—Bulletin FAS-1, 24 pp, describes horizontal and vertical discharge unit heaters for replacing process exhausted air with warmed fresh air and for comfort ventilation. Dimensions, capacities, and suggested methods of installation are given, and photos, drawings and diagrams are included. L. J. Wing Mfg. Co.

452 Improved Space Heaters — Sixteen-pp Bulletin 564 introduces the Counterflo space heaters with induced draft Pyrojet burner designed to burn gas, light or heavy oil, or combination gas and light oil. Burner and other components are discussed. A large cutaway drawing shows construction and operating features. Dravo Corp.

453 Electric Heating—Bulletin 975A, 12 pp, outlines advantages of electric heating and describes a number of different methods, such as radiant, con-

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(Begins on page 256)

vection, radiant and convection and forced hot air. Commercial and industrial applications are pictured, and specification and dimensional data included. Edwin L. Wiegand Co.

FANS, VENTILATING

454 Ventilation Units—Bulletin FM-315, 25 pp, describes basic construction of company's package propeller fans for commercial and industrial applications. Illustrated case histories of typical installations are included, as well as performance data, rating tables, performance charts. Buffalo Forge Co.

455 Air Engineering Equipment—Bulletin 106 contains detailed information on company's line of air engineering equipment, including various types of air conditioners, fan heaters, spray coolers, concentrator, spray deck coolers, condenser, fan cooler, liquid cooler. Niagara Blower Co.

456 PVC Blowers and Fans—Advantages of un-plasticized rigid polyvinyl chloride blowers and fans for exhausting corrosive air, fumes and gases are detailed in this illustrated bulletin. Physical properties of polyvinyl chloride are tabulated. An insert sheet describes other PVC products. Industrial Plastic Fabricators Inc.

457 Roof Ventilators—Sixteen-pp, Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data are included. Hartzell Propeller Fan Co.

458 Standard Duty Fans—Designs and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 543. Points out advantages, shows arrangement and application, describes accessories. The New York Blower Co.

459 Industrial Fans—Propellair Bulletin 650, 12 pp contains dimensions, application, and performance data on Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

460 Induced Draft Fan Data—In addition to providing an illustrated discussion of design advantages of company's induced draft Bifucator, 20-pp Bulletin DB-44-56 is an excellent working tool on fan selection. Two methods are presented, along with detailed examples of each. Also included are boiler code ratings of various organizations. DeBothezat Fans Div., American Machine and Metals, Inc.

461 Air Engineering—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements, entrance and elbow losses and duct sizes are provided. Also included are specifications for special-use equipment. Aerovent Fan Co., Inc.

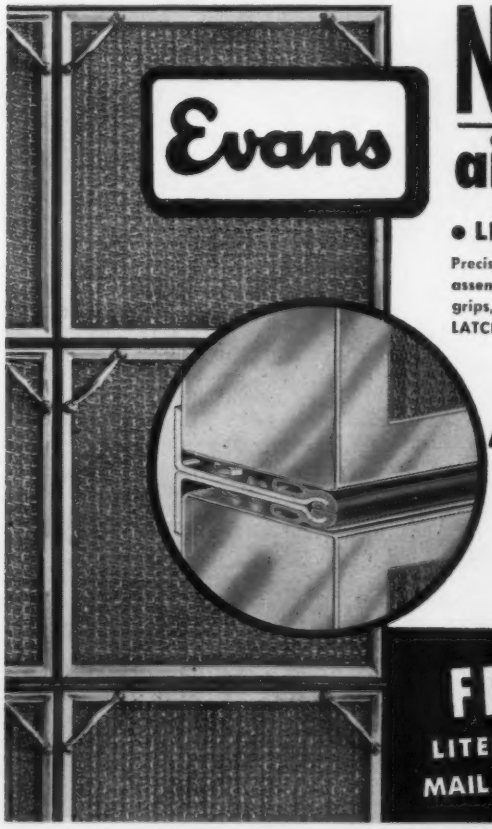
462 Air Conditioning System—Eight pp Bulletin 121 describes an air conditioning system which supplies fresh air with moisture removed in the summer and added in winter, under control that is maintained in "in between" seasons. Niagara Blower Co.

BOILERS, GENERATORS

463 Hot Water Boilers—Catalog HCC-2, 20 pp, describes and illustrates design, construction, advantages and economics of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Comparisons of heat content—water vs steam—is included on table. Combustion Engineering, Inc.

464 Two-Drum Boilers—Bulletin SB-58, 12 pp, describes company's two-drum boilers, which provide high capacity in a compact design that saves space and lowers installation and maintenance costs. Delineates improved features and gives design, construction information. Erie City Iron Works.

465 Packaged Generators—This 16-pp catalog describes a series of packaged steam generators in sizes from



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10,000 to 46,000 lb of steam per hour. Gives capacities, dimensions, construction features. Instrumentation is discussed. Illustrations include sectional drawings and installation photos. Foster Wheeler Corp.

466 Self-Contained Boilers — Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are detailed and a cutaway view showing flow of air in the forced draft system is included. Cleaver-Brooks Co.

467 Packaged Automatic Boiler— Six-pp Bulletin 1241 describes company's packaged automatic boilers for both air atomizing and pressure atomizing, for oil burning and for gas. Covers operating features and includes chart listing ratings, dimensions, weights and approximate fuel consumption. Orr & Sembower, Inc.

WATER CONDITIONING

468 Cooling System Treatment— Bulletin C1 describes advantages of company's treatment for cooling tower systems with synergised polyphosphates. Details of the cooling system treatment are fully covered in bulletin. National Aluminate Corp.

469 Water Softeners — Twenty-pp Bulletin 1855-A describes this manufacturer's Accelator Hot-Flow softeners and Hot-Flow softeners of the slurry retention type, covering advantages and applications of both. Describes and pictures reaction tank auxiliaries and associated equipment, and provides illustrations diagramming some typical installations. Sections of booklet are devoted to discussion of boiler feedwater treatment in general, limitations of hot process softening, and the chemistry of hot process treatment. Infilco Inc.

470 De-Ionization Processes — Various types of de-ionization processes and equipment are featured in Bulletin B-157. Covers mixed bed de-ionization, twin-bed de-ionization, industrial softeners, filters of various types, aerators for gas removal, clarifiers for flocculation, standard package units, power package for boilers and process water, and portable de-ionizers. Illinois Water Treatment Co.

DUST CONTROL

471 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included, as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

472 For Dust Collection—A collection of product sheets providing application suggestions and specifications on Dustkop equipment designed to solve a wide range of dust handling problems is provided in the Series 700 bulletins. Various models are described and typical installations illustrated. Also included is a section on accessories. Aget Mfg. Co.

473 Precision Air Cleaning—Design and principles of air filtering employed by company's air filter are covered in this loose-leaf file of bulletins. Includes data on test dust used to determine capacity, loading characteristics, resistance, air cleaning performance of all types of mechanical air filters. Applications are listed and complete specifications included, as well as efficiency charts. The George Evans Corp.

474 Hydro-Filter—Bulletin 556 describes outstanding feature of company's hydro-filter for industrial dust collection. Cutaway view shows construction and design details, and diagrams showing dimensions and a table of capacities included. National Dust Collector Corp.

STORAGE EQUIPMENT

475 Storage Equipment— Catalog 100-F, 72 pp illustrates and describes company's complete line of steel cabinets, folding chairs, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and specifications, as well as installation photos. Lyon Metal Products, Inc.

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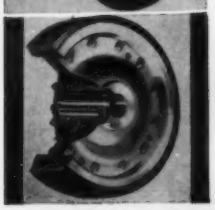

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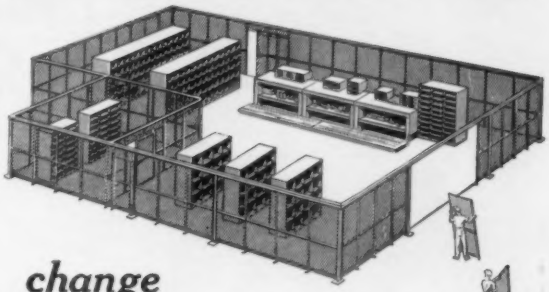

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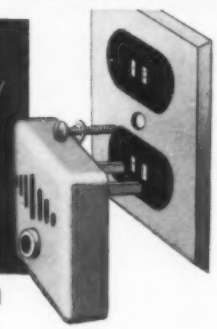

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(Begins on page 256)

476 Storage Shelving—Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, others. DeLuxe Metal Furniture Co.

OTHER EQUIPMENT

477 Industrial Finishing Equipment—Catalog A-657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking operations. The R. C. Mahon Co.

478 Phenolic Plastics—A primary evaluation of the properties of company's phenolics and the combinations in which they are available, in thermo-setting molding materials and industrial and coating resins, is featured in this illustrated bulletin. Properties and applications indicated. Durez Plastics Div., Hooker Electrochemical Co.

479 Boiler Tube Expanders—Bulletin Y-46, 16 pp, describes three general types of boiler tube expanders and includes detailed specifications to assist in selection. Along with the specification tables, the bulletin includes photos, drawings. Lagonda Div., Elliott Co.

480 Fighting Corrosion With Corrosion—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures, cathodic protection battery, and includes application data. Electro Rust-Proofing Corp.

481 Industrial Leathers—These illustrated data sheets cover company's leather products and include belting. Also

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give data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

483 Brinemaking Manual — Details on modern brine-making methods and equipment are presented in 12-pp Manual 135. Three types of brine-makers are described, as well as a wet salt storage system and cutaway views are included. Morton Salt Co.

484 Draft Starter—Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. An insert pictures and describes installations. Quickdraft Co.

485 Standard Storage Tanks — The broad scope of services to which company's standard storage tanks are put is covered in this 20-pp catalog. Such qualities as versatility and economy are stressed and typical installations are pictured. Engineering standards given. Graver Tank & Mfg. Co., Inc.

486 Shop Equipment—Work benches, tool stands, shelving and other pressed steel shop equipment for shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, bench top material and equipment variations offered are given in photos and text. Standard Pressed Steel Co.

487 Abrasion, Corrosion Protection —This 24-pp book illustrates how company's rubber faced steel plate reduces maintenance cost resulting from abrasion or corrosion. Shows case histories covering use. The Gates Rubber Co.

488 Neoprene Design Book — This illustrated Bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures. Elastomers Div., E. I. du Pont de Nemours & Co.

489 Humidification For Profit—Sixteen-pp Bulletin 500 presents data showing how relative humidity affects hygroscopic materials, health and comfort, and formation of static electricity. Schematic diagrams and sectional drawings demonstrate operation of electrically and air operated steam humidifiers. Armstrong Machine Works.

490 Heat Exchanger Tubing—Cited in this 30-pp catalog are typical cases where cupro-nickel or Monel tubing installed in heat exchangers resulted in substantial savings and better efficiency through longer tube life. Describes applications of this tubing in various instances where unusual water conditions, as to pollution, excessive turbulence, temperature and the like, required such tubing. The International Nickel Co., Inc.

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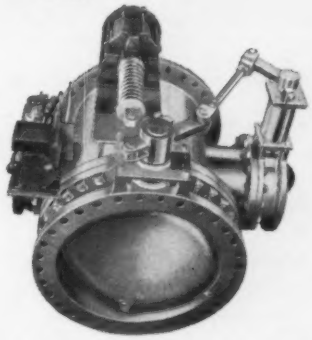
Your plant needs

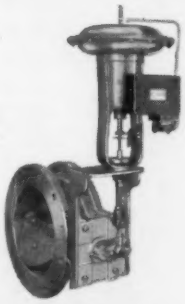
ROCKWELL VALVES *like these*

Standard heavy duty butterfly valve with Limitorque electric motor, declutching mechanism and handwheel for air, gases, water or other fluids.



Special four-way valve for hot air and exhaust gases in a gas turbine system; has 3 butterfly valves mounted on a steel pipe cross, with 2 valves connected to one hydraulic cylinder operator and one valve connected to an air cylinder with valve positioner for independent balancing purposes.

Standard butterfly valve with simplified bracket and linkage to air diaphragm operator and valve disc positioner; provides maximum adjustment, minimizes friction, eliminates backlash, chatter and hunting, reduces power requirement in close control applications.



What's your valve problem?

W. S. ROCKWELL COMPANY
2928 ELIOT STREET
FAIRFIELD, CONN.

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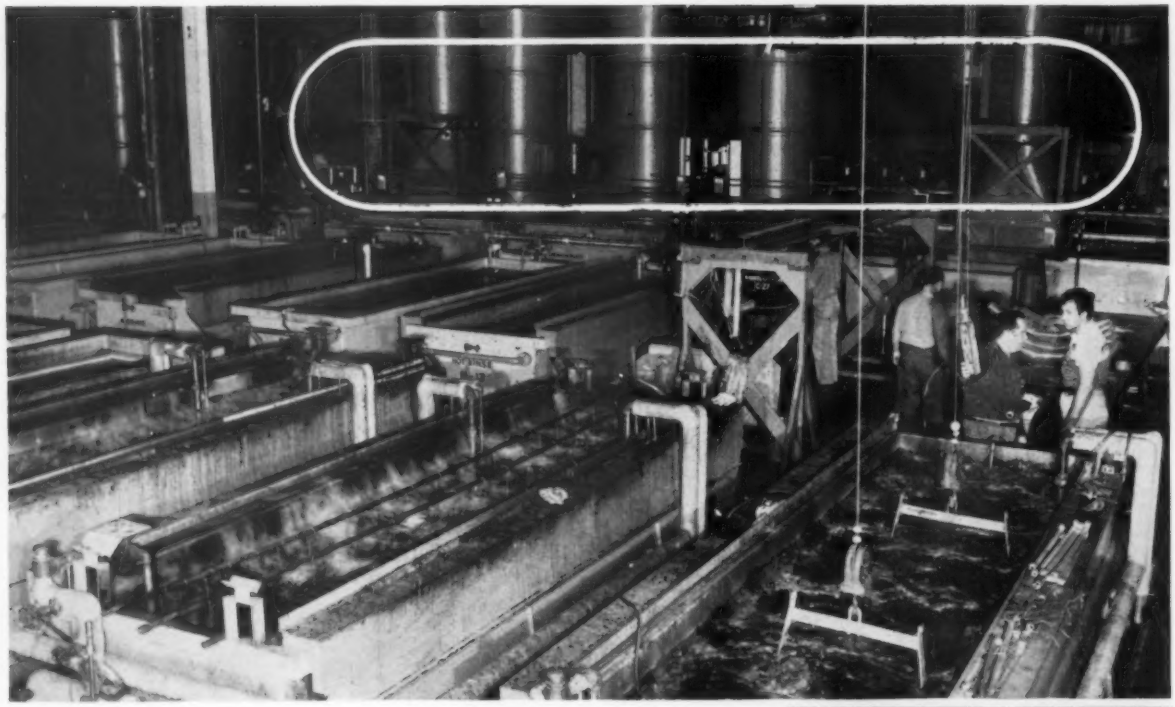


Here's a Unique Answer to a Tough Ventilating Problem . . .

Efficient Plating Tank Exhaust with No Overhead Obstruction

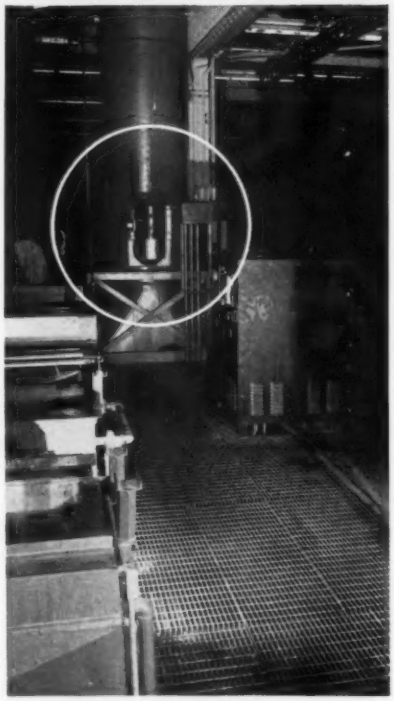
Hartzell High-Temperature Vaneaxial Blowers power this unique plating tank exhaust system at the Stratford, Connecticut plant of Sikorsky Aircraft Division, United Aircraft Corporation.

Use of the lateral slots and sub-floor ducts keeps aisles clear . . . and no part of the exhaust system extends above the tanks to hamper use of cranes in loading and unloading the tanks.

Exhaust of 200 CFM per square foot of tank area is provided with all blowers operating at approximately 2½" WG. Fumes are exhausted vertically through the roof.

Hartzell has the equipment that is just right for almost any industrial air moving job. See your nearby Hartzell field engineer for the details of how Hartzell can solve *your* tough air moving problem.

This installation was handled by the Hartzell field office at 1243 Post Road; Fairfield, Connecticut; phone Clearwater 9-3349.



Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

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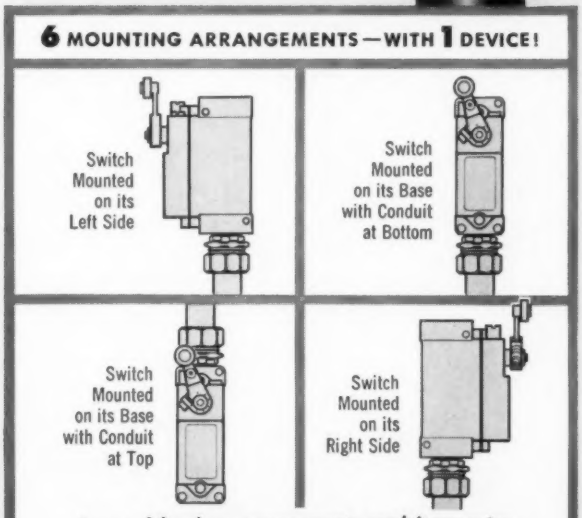
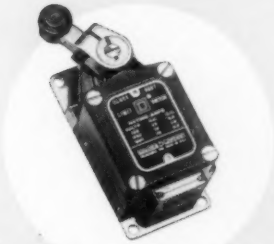
This New *PLUG-IN* LIMIT SWITCH is SO EASY to Use!

- Oil-tight construction
- Switch plugs in—in seconds
- Mounts without disassembly
- Wired without removing from box
- Reversible plug-in unit—can be plugged-in with roller arm at either end
- Switch action can be reversed by simple screwdriver adjustment
- Present installations easily converted to plug-in
- Precision switch mechanism —only 5° to operate— 25° overtravel in either direction
- Graduated markings around hub of roller arm simplify accurate settings
- Same price as standard Square D oil-tight limit switch

6 MOUNTING ARRANGEMENTS—WITH 1 DEVICE!


Switch Mounted on its Left Side
Switch Mounted on its Base with Conduit at Bottom
Switch Mounted on its Base with Conduit at Top
Switch Mounted on its Right Side

In any of the above arrangements, conduit can enter at either top or bottom by reversing box position



HEAVY-DUTY TYPE T OIL-TIGHT LIMIT SWITCH

has eleven contact arrangements in one switch. Arms continuously adjustable. Up to 80° overtravel. All switches are interchangeable, easy to mount. Separate packaging of lever arms and switches for simplified stocking.

Write for BULLETIN 9007 AW to Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

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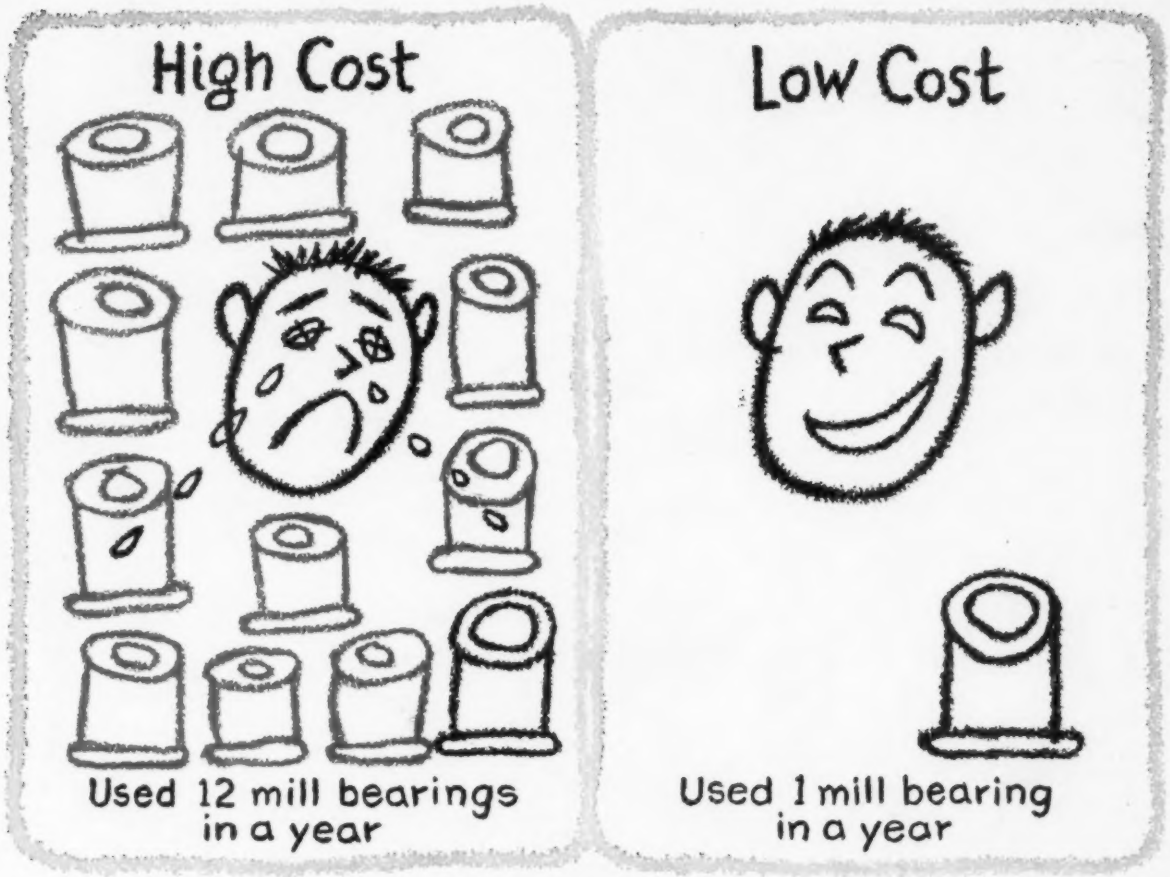

Before modern lubrication practice took over: $2,400 worth of these bearings were replaced to keep a 35" mill rolling for twelve months.

After assignment of a qualified lubrication engineer: one bearing ($200) served for a year, saving $2,200 a year, plus other savings.

Lubrication plan extends parts life—in this case, 12 times

We've just talked to a manufacturer who, in the past three years, has at least doubled the life of lubricated parts; and, in one case, increased the life of a large, expensive bearing *twelve times!* The same manufacturer succeeded in getting 312,000 tons of production on another bearing where 30,000 to 40,000 tons was the accepted average.

This may be a clue to industry management in general that taking lubrication practice for granted can cost enormous amounts of money in parts, lost production time and maintenance.

Developing opportunities for using modern lubrication plans like this, to turn regular losses into definite income, becomes a management function. And the management teams of quite a few major manufacturers are digging into their lubrication practices with the sole aim of making moving parts in operating machinery last longer.

Large companies find that the services of a plant lubrication engineer pay off. He can extend parts life, eliminate downtime, reduce the number of rejects (even save on lubricant cost) and otherwise add to income. Both here and in cases where operating budgets preclude a staff member, Texaco's organization of Lubrication Engineers functioning in all 48 States, can offer specific assistance. A more detailed discussion is available in an enlightening booklet: "Management Practices That Control Costs Via Organized Lubrication." Write The Texas Company, Dept. E20, 135 East 42nd Street, New York 17, New York.

TUNE IN...Metropolitan Opera Radio Broadcasts
Every Saturday Afternoon

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

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The magazine that helps plant engineers with their everyday problems

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